



**United States
Department of
Agriculture**

Forest Service

Pacific
Southwest
Region

June 1995

In cooperation with:

U.S.D.A.
Natural Resource
Conservation Service

Regents of the University of
California (Agricultural
Experiment Station)

Soil Survey

Inyo National Forest

West Area

California



How To Use This Soil Survey

General Soil Map

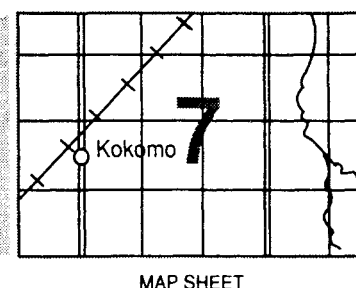
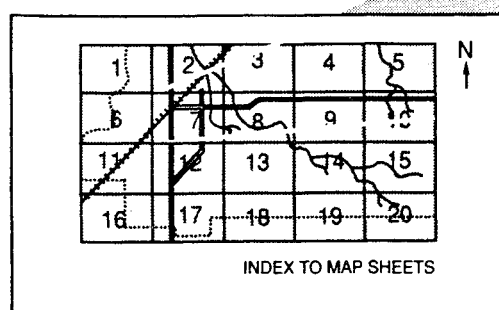
The general soil map, which is the small scale map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

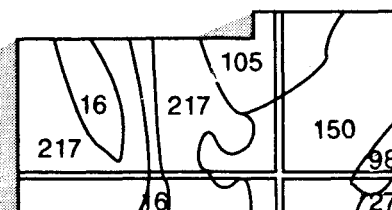
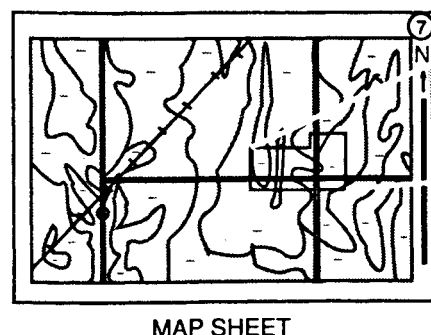
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

Inyo National Forest, West Area, California

This is a publication of the United States Department of Agriculture, Forest Service, Pacific Southwest Region, and is a joint effort with the University of California (Agricultural Experiment Station) and the Natural Resource Conservation Service. As a part of the National Cooperative Soil Survey, the fieldwork and technical quality control for this survey were the responsibility of the Forest Service. The correlation of the soils was done by the Natural Resource Conservation Service in consultation with the Forest Service. The Natural Resource Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, handicap, or age.

Major fieldwork for this soil survey was performed in the period 1978 - 1991. Soil names and descriptions were approved in March 1995. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1991. This survey was made cooperatively by the Forest Service and the Natural Resource Conservation Service. In addition, portions of the Bodie-Coleville and Benton-Owens Valley Soil Survey's were used in the development of this soil survey. The soil survey area consists of the western, non-Wilderness portion of the Inyo National Forest, in parts of Inyo, Mono, Madera, Tulare and Fresno counties.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: View northwestward from south of Mammoth Lakes, California in Long Valley Caldera. The Minaret's and Mammoth Mountain are in the background.

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Foreward

The Soil Survey of the Inyo National Forest, West Area, in parts of Inyo, Mono, Fresno, Madera and Tulare Counties, was designed to facilitate forestwide resource management planning and to increase the knowledge of our environment. It contains predictions of soil behavior for selected land uses. It also points out inherent limitations or hazards to land uses.

This soil survey has been prepared primarily for forest resource planners and managers. It is useful for preliminary project planning, for identifying general soil management considerations, and for evaluation of more intensive soil survey needs. The survey could be used for detailed resource management and project level planning with field verification.

Major differences in soil properties can occur even within short distances. Some soils are shallow to bedrock and have low available water capacity. These conditions inhibit plant growth. Some soils are seasonally wet and have a high water table or are subject to flooding.

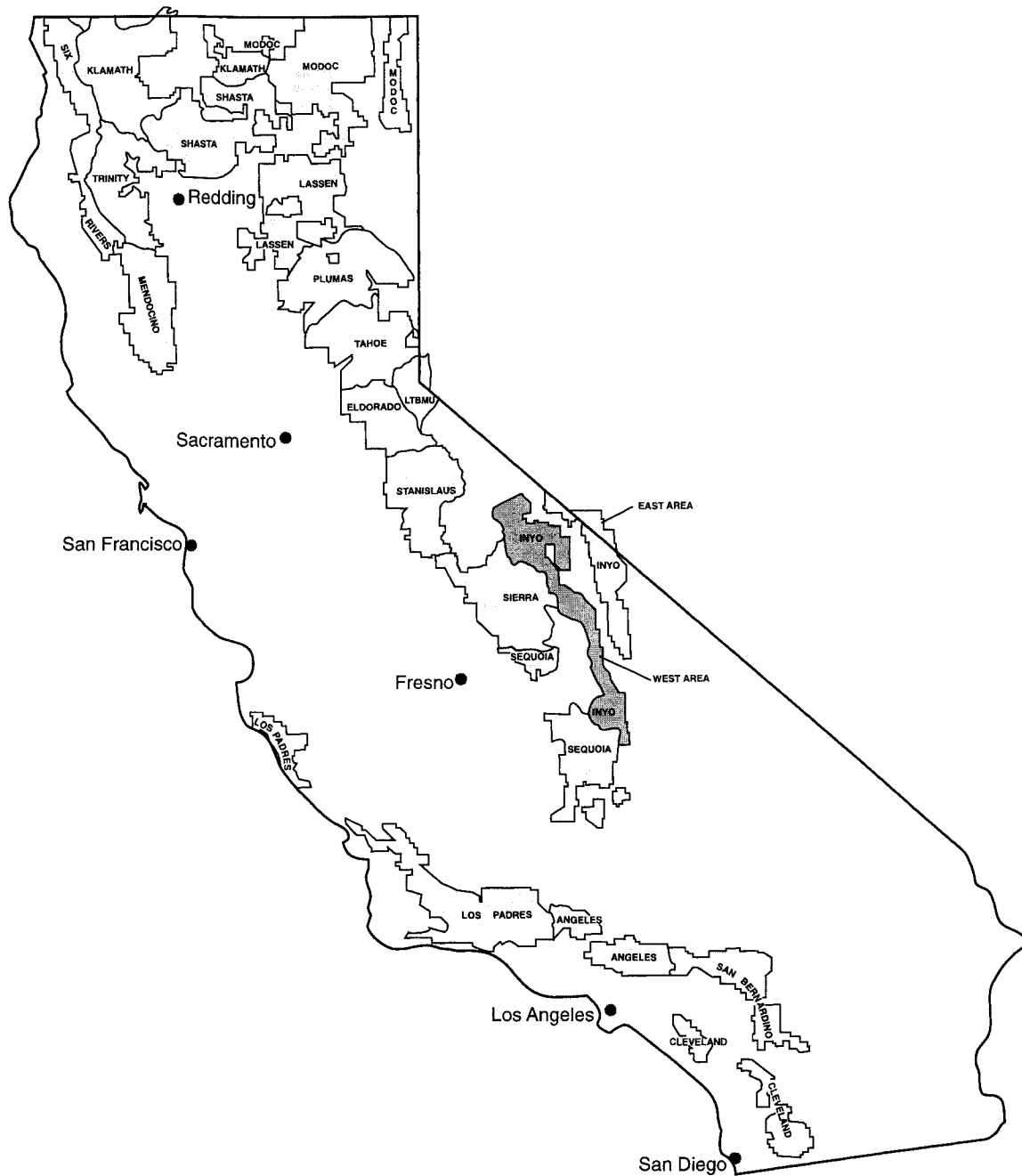
Soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each soil map unit is shown on detailed soil maps. Each kind of soil in the survey area is described, and information is given about each soil for specific uses.

This soil survey can be useful in the conservation, improvement, and productive use of soil, water, and other resources.



DENNIS W. MARTIN

Forest Supervisor
Inyo National Forest



Location of Inyo National Forest,
West Area California

Soil Survey of Inyo National Forest, West Area, California

By Joseph P. Seney and Juan A. Gallegos, Forest Service

Soils surveyed by Juan A. Gallegos, B. Scott Jackson
and Desiderio Zamudio, Forest Service

The Inyo National Forest, West Area, California is 792,677 acres in size. This acreage includes 28,000 acres of private land and 6,614 acres of land owned by the City of Los Angeles. Most of the acreage is in Mono County, with 516,341 acres and Inyo County, with 222,289 acres. The other counties are Madera, Tulare and Fresno Counties, with a total of 54,047 acres. The survey area includes only the nonwilderness portion of the eastern Sierra Nevada, or western side of the forest.

The Inyo National Forest is situated near the Los Angeles metropolitan area, one of the world's most heavily populated areas. The forest is responsible for providing timber and grazing in the area. It also provides recreational facilities, such as Mammoth Mountain, and unsurpassed angling and outdoor recreation. In addition, it provides a continuous supply of water to the six million people who live in the Los Angeles basin.

The survey area is located on the lower slope of the eastside of the Sierra Nevada. It extends about 165 miles in a north-south direction. The Toiyabe National Forest borders the survey area to the northwest. The portion of the Mono Valley Area which is administered by the Bureau of Land Management (U.S. Department of Interior), borders the area on the north and northeast. Adobe Valley, Benton Valley, Chalfant Valley and the Owens Valley define the area's eastern boundary. The Ansel Adams, John Muir, Golden Trout, Southern Sierra Wildernesses and Yosemite National Park serve as the area's western boundary, and the southern boundary is near the town of Coso Junction, California.

General Nature of the Survey Area

This section provides general information about the survey area. It discusses history and development, natural

vegetation, geomorphology, geology, relief, drainage, water supply, climate and soils.

History and Development

President Theodore Roosevelt created the Inyo National Forest by proclamation on May 25, 1907, when he withdrew 221,324 acres of land along the Owens River from settlement or entry. This was done to protect Los Angeles' water interests in the eastern Sierra. In 1908, an additional 1,350,537 acres were transferred from the Sierra National Forest to the Inyo by Executive Order 899. Then in 1911, President Taft directed that 275,000 acres in the Owens Valley be restore to public entry, thereby eliminating valley land from the Forest. Nine years later in 1920, the Kern National Forest was divided between the Sequoia and the Inyo, with the Mt. Whitney Ranger District going to the Inyo. The last large scale acquisition came in 1945 when the southern portion of the former Mono National Forest was transferred to the Inyo.

Archaeological investigations in the Forest and in the surrounding region indicate that human occupation began 10,000 or more years ago. Paleoindian sites have been found in Mono Basin, Long Valley and Owen Valley. There is also evidence that use of the outstanding obsidian sources on the Forest began at this time. Indicators surfaced sometime around 6,000 years ago, suggesting that more intensive use of the area, with generally increasing population through time.

Five centuries after the time of Christ a major change in land-use patterns becomes apparent in the archaeological record. By 1,000 years ago in the Owens Valley there is a clear shift to sedentary villages, intensive use of Pinyon pine, and development of the territorial

boundaries seen at the time of historic contact. At this time we also see the beginning of an alpine adaptation in the White Mountains where the highest altitude village sites in prehistoric North America are found. Some researchers hypothesize that this change signals the movement of the ancestors of contemporary Native Americans into the area.

In the mid-19th century when non-Indian people began to move into the eastern Sierra, they invaded lands occupied by Paiute and Shoshone peoples. Mono Basin was the territory of the Kuzedika's Paiute. As was common in the Great Basin, these folk took their name from an important food source, namely the brine fly, and the name means "brine-fly-larvae eaters". Whether Long Valley contained a resident population has not yet been established. It was used by native people from all the surrounding area, including the North Fork Mono from the western Sierra. From Benton south to Owens Lake, the land was claimed by various bands known collectively as the Owens Valley Paiute. These bands had a greater degree of socio-cultural integration than most Great Basin groups, with permanent villages, irrigated lands, individual ownership of Pinyon trees and hereditary headmen. At the southern end of Owens Lake and in Saline Valley were the southern Shoshone bands and in the southern Sierra Nevada were the Tubatulabal. Today the descendants of these people are organized into 11 different federally recognized tribes and communities.

In the early 1850s the area saw the encroachment by non-native settlers, miners, and traders. As the population expanded and grew, the Owens Valley and Mono Basin areas took on a rural agriculture or ranching character, depending on the availability of transportable water. This supported nearby mining activity which was experiencing a boom era. Both narrow-gage and wide-gage railroads and wagon roads provided the means of marketing the meat and produce in the mining camps.

About the turn of the century the water of the area took on additional significance. Hydroelectric developments were built to meet the needs of both local and distant modernization. The export of water from the Owens Valley to the Southern California urban areas gradually increased as property and water rights were acquired, paralleling the decline of agriculture and mining. Today, the City of Los Angeles is the third largest land management agency of the area, with 330,000 acres of the valley floor devoted to limited ranching or non-use. The Forest Service, Bureau of Land Management, and City of Los Angeles now control more than 95 percent of the basin area and tourism has become the principal industry.

The Inyo National Forest is one of the highest recreational-

use Forests in the United States, with more than six million visitors each year. The other resources of the Forest are important, although they primarily provide support for recreational activities and the needs of the resident populations.

Vegetation

Vegetative diversity on the Inyo National Forest has been significantly altered from natural levels primarily through water diversion, especially affecting riparian areas and wet meadow systems. Past overgrazing and fire suppression have reduced seral stage diversity and allowed woody vegetation to encroach on meadow systems preventing natural fire-caused rejuvenation. In addition, commercial timber management has reduced the extent of older seral stages of coniferous forests.

The vegetative cover (4) is predominantly semi-desert (shrubs) communities in lower and mid-elevations with mixed conifer forests communities at higher elevations. Most conifer stands are at elevations above 6,000 feet. An estimated two percent of the survey area is wetland vegetation.

The natural vegetative groups and their approximate proportionate extent in the survey area are as follows:

Sagebrush Steppe	40 percent
Montane-Subalpine Forest	25 percent
Jeffrey Pine Forest	13 percent
Barren-Rock Outcrop	12 percent
Juniper-Pinyon Woodland	3 percent
Blackbrush-Shadscale scrub	3 percent
Chapparral	2 percent

The sagebrush steppe community includes shrubs, forbs and grasses well adapted to withstand long periods of heat and drought. Basin or big sagebrush (*Artemisia tridentata*) 4,000 feet to 10,600 feet with bitterbrush (*Purshia tridentata*) and low sagebrush (*Artemisia arbuscula*) dominant in slightly drier and saline-alkaline areas, respectively. Some of the common sagebrush steppe plant species are sagebrush (*A. nova* and *A. rothrockii*), manzanita (*Arctostaphylos spp.*), wheatgrass (*Agropyron spp.*), needlegrass (*Stipa spp.*) and squirreltail (*Sitanion hystrix*).

The Montane-Subalpine and Jeffrey Pine Forests generally occur in mixed stands, although pure stands of Jeffrey pine (*Pinus jeffreyi*) and red fir (*Abies magnifica*) do occur. The elevational range for these forest communities range from 6,000 feet for Jeffrey pine (*Pinus jeffreyi*) to greater than 9,000 feet for red fir (*Abies magnifica*) and lodgepole pine (*Pinus contorta* var. *murrayana*). Other common Montane Forest species are

foxtail pine (*Pinus balfouriana*), white fir (*Abies concolor*), mountain hemlock (*Tsuga mertensiana*), western white pine (*Pinus monticola*), big sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*) and manzanita (*Arctostaphylos spp.*).

The Barren-Rock Outcrop vegetative group, ranging from 4,000 feet up to 13,400 feet, occurs throughout all other vegetative groups. At higher elevations, including alpine communities, dominant vegetation consists of sedges (*Carex spp.*), rushes (*Juncus spp.*), buckwheats (*Eriogonum spp.*), fescue (*Festuca spp.*), phlox (*Phlox spp.*), bluegrass (*Poa spp.*) and squirreltail (*Sitanion spp.*), mountain mahogany (*Cercocarpus spp.*), in dry to moist sites. Some of the common wet site plant species are sedges (*Carex spp.*), rushes (*Juncus spp.*), willow (*Salix spp.*), birch (*Betula occidentalis*), wild rose (*Rosa woodsii*) and aspen (*Populus spp.*).

Juniper-Pinyon Woodland occurs sporadically throughout the survey area, generally on dry east slopes of the southern Sierra and the Mono Lake area. The elevation ranges from 6,000 feet north of Bishop to 7,500 feet in the Mono Lake Basin. Common plant species in this woodland area are singleleaf Pinyon (*Pinus monophylla*), western juniper (*Juniperus occidentalis*), Utah juniper (*J. utahsis*), curlleaf mountain mahogany (*Cercocarpus ledifolius*), basin sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*) and rabbitbrush (*Chrysothamnus parryi*).

The Blackbrush-Shadscale and Chaparral communities cover approximately five percent of the survey area. In general, Blackbrush-Shadscale communities are located throughout basins in the southern portion of the survey area and in valleys southeast of Mono Lake. A few common species are blackbrush (*Coleogyne ramosissima*), shadscale (*Atriplex confertifolia*), bud sagebrush (*Artemisia spinescens*), Nevada ephedra (*Ephedra Nevadensis*), greasewood (*Sarcobatus vermiculatus*) and hopsage (*Grayia spinosa*).

Geology and Geomorphology

The survey area straddles the boundary between the Sierra Nevada and Basin and Range physiographic provinces. The Sierra Nevada has been block faulted upward relative to the Owens Valley, the Long Valley Caldera, and Mono Lake along a series of large, normal faults which extend the length of the survey area. Characterized by great topographic relief, the area is underlain by a variety of bedrock materials which have been subjected to mechanical weathering by water and ice, but are largely unaffected by chemical alteration. Mechanical weathering and volcanic events have resulted in a limited variety of surficial deposits. Landforms

within the study area are most commonly associated with erosion subsequent to fault movement within the last 3 million years, glacial activity within the last 1.2 million years, and volcanic activity within the last .7 million years. Major drainages are short and are most commonly the result of glacial modification. Elevations within the area range from 3,760 feet just west of Owens Lake, to 13,665 feet on Birch Mt. and over 12,000 feet on Lone Pine Peak, Mt. Tinemaha, and Mt Warren.

The bedrock in the study area is composed of igneous rock, both intrusive and extrusive, and slightly metamorphosed volcanics and sedimentary sandstones, limestones and shales, such as quartzites, marbles and slates. The intrusive rock types are primarily granite, quartz monzonite, and grandiorite and can be found throughout the mountainous portions of the survey area. The extrusive rock types are primarily rhyolites, basalts, and volcanic tuffs which occur within what is known as the Long Valley Caldera, between the northern edge of the caldera and Mono Lake, on what is known as the volcanic tablelands, and within a small volcanic field south of the town of Big Pine.

Surficial deposits are abundant in the survey area and are alluvium and colluvium, glacial till, and loose pumiceous or cindery volcanic material. Unconsolidated alluvium (stream and fan deposits) occurs throughout the low relief portions of the survey area. Stream-reworked glacial till occurs within the Long Valley Caldera and adjacent to Mono Lake. Colluvium (talus and angular loose rock on steeper slopes) occurs on the higher relief portions of the survey area. Glacial till occurs on the topographic transition between the high and low relief portions of the survey area north of Big Pine creek and makes up a substantial portion of the surficial deposits at the mouths of Hilton, McGee, Convict, Laurel, Mammoth, Reverse, Rush, Bloody, Lee Vining, and Lundy Creeks. Loose pumiceous and cindery material occurs within the western portion of the Long Valley Caldera, between the caldera and Mono Lake, and within a small volcanic field south of the town of Big Pine.

Water resources within the Inyo National Forest are strongly influenced by topography and can vary widely over relatively short distances. For example, streamflows fluctuate significantly within the watershed, and vary from intense, high-volume, short duration flows to very minimal flows to intermittent flows which may dry up during July and August. The differences in streamflow are related to time of day and season, highly variable precipitation, local geology and geomorphology. Water flowing off the Forest amounts to an average of 1,093,000 acre-feet per year. Groundwater recharge from precipitation is another important water resource. Most

recharge occurs in the upper elevations, especially in montane and subalpine meadow systems. Finally, a third significant water resource is geothermal. Approximately 260,000 acres of the 460,000 acre Mono-Long Valley known Geothermal Resource Area are on National Forest land. Approximately 39,000 acres are currently under lease.

Climate

The climate in the survey area has both Mediterranean and Basin and Range type influences, consisting of dry, hot summers with occasional afternoon thundershowers and cool, moist winters. The eastern Sierra escarpment strongly influences temperature and precipitation patterns, which can vary greatly over short distances.

In general, temperature decreases and precipitation increases with an increase in elevation. Summer daytime temperatures can top 100°F at lower elevations with nighttime temperatures in the 60's. In higher regions in January, temperatures range from -20 to 40°F. Precipitation ranges from 4 inches a year on the Owens Valley floor (4,000 feet) to 45 inches a year at Mammoth Pass (9,000 feet). In most situations, 80 to 90 percent of precipitation falls as snow, especially at elevations greater than 7,000 feet.

Formation of Soils

Soil is a mixture of rocks, organic matter, water and air, in varying amounts. The five soil forming factors are: **1) parent material** - the physical and chemical composition of the parent material; **2) relief** - the effects of aspect, slope and drainage; **3) climate** - the site precipitation and temperature patterns; **4) biological activity**; and **5) time** - the length of exposure of the parent material to the other soil forming factors.

The relative importance of each factor differs from place to place, although the interaction of all the factors determines the kind of soil that forms in any given place.

The parent material of the soils in the survey area is both residual and transported. Essentially, soils are formed in weathered rock or unconsolidated material. The geologic parent materials in the survey area exhibit wide diversity of age and rock types. The type of parent material greatly influences soil development and related properties. For example, soils developing over granitics or quartz monzonite typically have coarser textures and a higher percentage of sand particles. Conversely, soils developing over basalt tend to have finer textures and a higher percentage of silt particles.

The relief or topography of a landscape setting is usually influenced by the type of bedrock. Relief influences soil formation primarily by its effect upon drainage, steepness of the terrain, runoff and aspect or exposure to the sun and wind. For example, a very steep south-facing slope in the survey area generally, will have shallow soils, rapid runoff, and more importantly, is covered with a less dense vegetative cover due to its drier and warmer nature. Conversely, on northeast-facing slopes, soils will be deeper, have slow to moderate runoff and a thicker vegetative cover as a result of less solar radiation, which generates cooler and wetter sites.

The amount of solar radiation is a prime example of how climate affects soil formation. Heat and moisture influence the amount and kind of vegetation that grows, the rate at which vegetation and minerals weather and the removal and accumulation of material in different soil layers. In general, summers are dry except for occasional thundershowers at higher elevations. Winters are cool and moist, and most precipitation falls between December and March. Soils remain moist through late spring, but by July and August these same soils are very dry. Soil moisture is considered the most limiting plant growth factor throughout the eastern Sierra.

Vegetation is the dominant biological force that affects the formation of soils. Vegetative growth results in the accumulation of organic material in the surface layers, provides shade and duff which reduces surface runoff and erosion, the penetration of roots which promotes cycling of water and nutrients, provides habitat and a food source for small animals, insects, bacteria and fungi which provide the mechanisms for cycling of organic materials, soil and soil nutrients. For example, soils that develop under sagebrush vegetation are low in organic matter and often have a light-colored surface layer and sparse litter deposits. Soils that develop under dense, perennial grasses normally have a higher organic matter content and a dark-colored surface layer.

A key component in the development of soils is time. Generally, the age of a soil is related to the degree of profile development and layer differentiation within the soil. Immature or young soils have little or no horizonation. For example, many soils in the survey area are Entisols or Inceptisols, such as, Nanamkin and Stecum soils. Meanwhile, soils with strong layer or horizon development are considered mature or older soils. These soils have pronounced accumulations of materials such as clay or calcium carbonate in subsurface horizons. Temperature and moisture are the two critical factors which control soil development through time. For example, soils at elevations greater than 11,000 feet in the survey area have sufficient moisture, but temperatures are too cold to promote rapid soil development. Conversely,

soils at elevations below 6,000 feet have warmer temperatures, but lack sufficient moisture for significant soil profile development.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land use allocations to the limitations and potentials on natural resources and the environment. Also, it can help avoid soil-related failures in land use.

Information in this section can provide a basis for assigning management priorities to land areas that have few or less severe limitations and for determining areas where more detailed or site-specific soil information is needed. Additional information about each soil and its use and management is given under "Detailed Soil Map Unit Descriptions". In that section, individual soils are evaluated for their productivity, their manageability limitations, and their potential for production of forage and timber.

Watershed

The vast majority of runoff from Inyo National Forest land is used for domestic or municipal supplies or for irrigation. Although small and localized bacterial, nutrient and chemical problems exist, established basin water quality objectives are met by 97 percent of the total of approximately 1,093,000 acre-feet per year of water flowing off Forest lands.

Soils in the Forest are managed for watershed protection by preventing soil erosion and maintaining productivity. Overland flow or runoff on shallow forest soils can increase tremendously when wildfires induce the formation of water-repellent soil layers. Prevention of large wildfires through more intensive vegetative management is an important objective of soil management. Overall, the major source of sediment on the Inyo are wet meadows that have been severely eroded over the past century. The 1981 Forest Watershed Improvement Needs (WIN) inventory surveyed 26,000 acres of meadow, 23,560 acres of which needed improvement to either maintain or restore water quality.

Range Production

The range forage program on the Inyo National Forest currently ranks fifth among Forests in California with 41,400 AUMs (Animal Unit Months) of use. An animal-unit-month is the amount of forage required to feed one animal unit, one cow, one mule, five sheep or five goats for 30 days. The grazing season typically extends from late June to late September. Range allotments cover 886,103 acres, of which 399,296 acres are actually suitable for grazing. In many cases, these lands need prescribed fire treatment and water development to be suitable for commercial grazing.

Soil properties that affect moisture and plant nutrients have the greatest influence on productivity of range plants. Generally, the most productive range soils are those that have a high available water capacity and are located in areas where precipitation occurs throughout the growing season. Proper forage utilization should ensure enough cover to protect the soil and maintain or improve site productivity. For example, adequate litter and duff, fencing, distribution of water and salt blocks, and supplemental feeding are practices which maintain or improve range productivity.

Wildlife Habitat

Soils affect the distribution and density of vegetative cover that is available to wildlife as food and cover. In addition, they also affect the construction of man-made or natural water impoundments, which in turn, can significantly influence the quality of wildlife habitat.

Fish, wildlife, and botanical resources occur across the landscape. As in all natural systems, these resources are not evenly distributed. The Inyo National Forest stretches across four vegetative provinces; Great Basin, Sierra Nevada, Mohave and Sonoran. The riparian or wet meadow portions of these provinces provide the best opportunities for wildlife to prosper. Overall, this wide array of vegetative types provide habitat for over 400 terrestrial vertebrate species, including two Federally listed birds (bald eagle and peregrine falcon), 13 Federal candidate species, eight species recognized as sensitive within California, and over 50 neotropical migratory birds.

The northern goshawk and the pine marten are two species associated with mature timber vegetation types. These species, as well as wolverines, Sierra Nevada red fox, and fishers are fairly common along the eastern slopes of the Sierra Nevada, especially in late seral stage Jeffrey pine forests. Other species of interest include three herds of mountain bighorn sheep in the high Sierra and one herd of Nelson mountain sheep that range throughout the White-Inyo mountains.

Amphibian populations are relatively rare, with isolated populations, due to predation by introduced species of trout. Populations of mountain yellow-legged frogs, Pacific chorus frogs and Yosemite toads are generally found in high-elevation alpine lakes and creeks. Although, two populations of yellow-legged frogs have been found at lower elevations in the eastern portion of the Mono Lake District. In addition, Mono Lake is a highly productive inland sea which contains an abundance of both brine shrimp and brine flies. These aquatic invertebrates provide a food source for over one million shorebirds and waterfowl.

Recreation

Recreation is the most significant resource on the Inyo National Forest, and the Forest has consistently ranked within the top five National Forests nationwide in terms of total recreation use. An estimated 8,500,000 recreation visitor days (RVD's), or 21 million recreation visits were recorded in 1994. The intensive recreation visitation is a direct result of the Forest's location, near the Los Angeles metropolitan area and the wide and varied dispersed activities available on the Forest. Dispersed recreation use occurs over 1.9 million acres designated Wilderness and other undeveloped areas, accounting for approximately 30 percent of the total use. The bulk of the recreation use occurs in the developed areas, such as ski areas, campgrounds, picnic sites, visitor centers, and lodges, which is concentrated within about two percent of the land base.

The Inyo National Forest has over 3,000 developed campsites, both public and private, 1,100 miles of foot trails and over 5,000 miles of unpaved vehicle routes. Nearly every major drainage of the Sierra Nevada on the Inyo National forest outside of designated Wilderness is currently occupied with concentrated recreation developments. Increased use of the Forest by recreational off-road vehicles, off-road bicycles, horse and foot traffic has intensified soil impacts, especially soil compaction, reduced infiltration and increased surface runoff so that it becomes necessary to close campgrounds and reroute foot or vehicular paths.

Soils in the survey area are rated in the map unit descriptions for their manageability. The rating system considers soil properties useful in recreation planning. For site-specific planning, more detailed soil investigations and interpretations may be required. The following is a brief overview of a few soil characteristics important for some kinds of recreational sites.

Trail systems for hikers, horseback riders, and off-road bicyclists should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding for extended periods of time. In addition, trails should be located on nearly level to moderate slopes, with slopes not exceeding 12 percent.

Campgrounds and picnic areas require site preparation such as shaping and leveling and are subject to heavy foot traffic. The best soils have similar characteristics as soils for trail systems, nearly level slopes, firm when wet, not dusty when dry, with few stones and boulders.

Forestry

The commercial timber base consists of 75,000 acres of which 60,000 acres is Jeffrey pine, 11,000 acres is lodgepole pine and 4,000 acres is mixed conifer. The timber base is located between the towns of Mammoth Lakes and June Lake, is bounded on the west by the San Joaquin crest and extends east to Glass Mountain. The sites are generally poor, with Forest Site Classes of 5 or 6.

The allowable sale quantity (ASQ) as set by the Forest Plan is 7.1 million board feet annually. This has traditionally been broken out into sawlog sales, 5.5 million, and fuelwood sales of 1.6 million. Sawlog sales are logged over snow with ground-based equipment, while fuelwood sales are performed in the summer with equipment varieties from pickup trucks to skidders. Sawlog sales impact three to five thousand acres annually, while fuelwood sales impact an additional 500 to 1,000 acres. Moreover, an additional 3.2 million board feet has been removed by public fuelwood cutters. Demand for fuelwood has significantly increased in the past few years, and as a result, fuelwood gathering areas are being overutilized. Care must be taken to protect the soils.

How This Soil Survey Was Made

This is an Order 3 soil survey. It has followed the directives and guidelines in the Forest Service Manual and Handbooks and the concepts, procedures, and guidelines of the National Cooperative Soil Survey as specified in the Soil Survey Manual (5), the National Soils Handbook (1,7), and the soil classification system as stated in Soil Taxonomy (6).

Soil Scientists began the inventory by collecting, studying, and correlating soil genesis and morphology data, including lithological (3), geomorphological, topographical, climatic, vegetative data for the soil survey area and for adjoining areas, mainly the Bodie-Coleville and Benton-Owens Valley survey areas.

The data and information were assimilated and transferred to a single base map of suitable scale and accuracy, forming the beginning soil map unit delineations, or a schematic map. With the schematic map and aerial photograph field sheets (stereo-pair coverage) in hand, a reconnaissance study of the survey area was made. The delineations on the schematic map were checked for accuracy of content and location. The aerial photos were studied and the photo images were compared to the conditions found on the ground to ensure that later recognition by photograph interpretation would be credible. Lithologic, geomorphic, soil, and vegetative characteristics were recorded in field notes, on the schematic map, and on the aerial photograph field sheets.

Using the augmented and corrected schematic map, field notes, and an understanding of how the photograph images relate to actual conditions on the ground, the soil scientists delineated map units on the aerial photographs. The map units corresponded to segments of the landscape having similar landform, vegetative cover, and soils as determined by a knowledge of ground conditions and by stereoscopic aerial photograph interpretation. The aerial photographs with the delineated map units and delineation symbols became the exploratory or preliminary soils map.

With the aerial photographs (exploratory soils maps) and a field stereoscope, the soil scientists examined as many delineations of each map unit on the ground as was possible, considering limited access in places and the time allowed to complete the survey. Map units were examined, studied, and described by aerial photograph interpretations and on-the-ground investigations.

Because the survey is Order 3 in intensity (2), and because of the time allotted for its completion, not every delineation of each map unit was visited and examined on the ground. Few delineations with no easy access were visited, but they were scrutinized by aerial photograph interpretation. Possibly one-third to one-half of the delineations on the field sheets and maps were not examined on the ground. Consequently, the data in this report are not suitable for project planning without field verification.

At each site that was visited and examined, individual soils were studied, named, described and classified, and enough data were collected to make interpretations and predictions concerning the use and management of each soil. However, the exact location of each soil was not delineated. The map units in most places consist of a group of soils on a particular landscape that has been delineated on the aerial photograph field sheets. Depending on the area location and extent of the individual soils that are components of the delineated map unit, a map unit is called a consociation, an association or a complex. The soil scientists made a field study and aerial photograph examination to estimate the percentage of each soil component in each map unit. The map units do not necessarily consist of similar soils. They consist of geographically associated soils that may be, and in places are, quite different in their characteristics and their suitability for use and management. For this reason also, the data in this report are not suitable for project planning without field verification.

The interpretations and predictions concerning use and management in this report are based on the soil scientists' knowledge and understanding of the conditions recognized and measured in the field. In classifying the soils, soil scientists can also, with acceptable reliability, bring information concerning use and management of a particular soil from other survey areas where the same soil occurs and has been recognized and studied. Some use and management interpretations and predictions should be considered as first or second approximations owing to the relatively few examinations and measurements that were made. This is still another reason that limits the data in this survey for project planning without field verification.

Despite the cautions that have been given concerning the use of data in this survey for project planning, the survey is adequate and reliable for its intended and designed purpose: a base for a forestwide system of land management planning.

General Soil Map Units

The general soil map shows map units which consist of many individual soils. Each map unit consists of soils that have similar soil temperature regimes and parent material. A map unit typically is made up of one or more soils of major extent and several soils of minor extent. Map units are named for the major soils in the unit. The soils in one unit can occur in other units. The soils are classified at the family level or a higher taxonomic level.

The general soil map furnishes a broad perspective of the soils in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. General areas which are capable of timber production or spring-summer range can be identified on the map. Likewise, general areas of soils having properties that are distinctly unfavorable for certain land uses can be identified.

Because of the generalization of map units and the small scale of the map, the location of specific soils is not shown. The map and map unit information are not suitable for land management planning at the forestwide or project level. They give a very general overview of soil conditions and are suitable for state or regional planning. Groups of soils and the map units making up each group are described on the pages that follow.

Soils in the Thermic Soil Temperature Regime

In the thermic soil temperature regime, the mean annual soil temperature is 59 to 72°F. The soils in this group are generally on gentle aspects at an elevation of 3,700 to 6,800 feet. They are on alluvial fans, fan terraces and bench terraces. Slopes range from 5 to 30 percent. Annual precipitation ranges from 4 to 10 inches.

The soils in this group are deep to very deep and are moderately well drained to excessively drained. The plant species on these soils are white bursage, spiny hopsage, schadscale, Nevada ephedra, blackbrush and desert needlegrass. These soils are used mainly for watershed, wildlife habitat, and recreation.

1. Goodale-Lubkin-Whitewolf families

The soils in this map unit formed in material weathered from granitic and basaltic rock. They are on alluvial fans, fan terraces, bench terraces and lower hillslopes that have slopes of 5 to 30 percent. This unit makes up about one percent of the survey area.

Approximately 31 percent of the unit is Goodale family, 27 percent is Lubkin family soils, and 26 percent is Whitewolf family soils. The remaining 16 percent is comprised of the Taboose, Arizo and Cajon families.

Goodale family, granitic alluvium soils are very deep, have a bouldery loamy coarse sand surface layer and are somewhat excessively drained. Lubkin family soils are formed in granitic alluvium with a gravelly loamy sand surface layer and are well drained. The Whitewolf family has similar characteristics but has a coarse sand surface texture.

Soils in the Mesic Soil Temperature Regime

In the mesic soil temperature regime, the mean annual soil temperature is 47 to 59°F. The soils in this group are widely distributed throughout the survey area. The soils in this group formed in material that weathered from granitic, basalt, metamorphic rocks, pumice and tuff. The elevation ranges from 4,300 to 9,600 feet. The soils are on mountainsides, hillsides, valley bottoms, lake terraces, fan terraces, moraines, ridges and colluvial slopes. Slopes range from 0 to 90 percent. Annual precipitation ranges from 4 to 30 inches.

The soils in this group are shallow to very deep and are well drained to excessively drained. The plant species on these soils are big sagebrush, Jeffrey pine, red fir, lodgepole pine, singleleaf pinyon and western juniper. The areas are used mainly for watershed, wildlife habitat, recreation and fuelwood production.

2. Wrango-Berent-Waterman families—Rock outcrop

The soils in this map unit formed in material that weathered from granitic rock. They are on mountainsides, hillsides, lake terraces, moraines, ridges and colluvial slopes of slopes of 0 to 90 percent. This unit makes up about 19 percent of the survey area.

Approximately 56 percent of the map unit is Wrango family soils, 17 percent is Berent family soils and 15 percent is Waterman family soils. The remaining 12 percent is comprised of minor components of a variety of other family soils and rock outcrop.

Wrango family, weathered from granitic materials are very deep, have a loamy coarse sand surface layer and are somewhat excessively drained. Berent family soils are formed in granitic materials with a loamy sand surface layer and are somewhat excessively drained. The Waterman family has similar characteristics as the Wrango and Berent families.

3. Rock outcrop-Bairs family-Torriorthentic Haploxerolls

The soils in this map unit formed in material that weathered from granitic, basaltic and mixed rock. They are on alluvial fans, fan terraces, glacial moraines, hillsides and mountainsides, on slopes of 0 to 90 percent. This unit makes up about 8 percent of the survey area.

Approximately 15 percent of the unit is rock outcrop, 15 percent is Bairs family soils, 15 percent is Torriorthentic Haploxerolls. The remaining 55 percent is comprised of a variety of other family soils.

Bairs family, granitic and mixed alluvium soils are very deep, have a gravelly loamy coarse sand surface layer and are well drained. Torriorthentic Haploxerolls are formed in material weathering from mixed and basalt rocks with a gravelly sandy loam surface layer and are deep, somewhat excessively drained.

4. Delaney-Brantel families-Vitrantic Torriorthents

The soils in this map unit formed in material that weathered from pumice and tuff. They are on mountainsides, hillsides, hilltops, lake terraces, upland valleys, alluvial fans, upland flats, mesas and bottomlands that have slopes of 0 to 60 percent. This unit makes up about 16 percent of the survey area.

Approximately 32 percent of the unit is Delaney family, 26 percent is Brantel family soils, 26 percent is Vitrantic Torriorthents. The remaining 16 percent is comprised of a variety of other family soils and rock outcrop.

Delaney family, pumice and tuff soils are moderately deep to deep, have a gravelly loamy sand surface layer and are somewhat excessively drained. Brantel family soils are formed in pumice and tuff with a coarse sand surface layer and are somewhat excessively drained. Vitrantic Torriorthents has similar characteristics but has a sand surface layer.

Soils in the Frigid Soil Temperature Regime

In the frigid soil temperature regime the mean annual soil temperature is 32 to 47°F. The difference between mean winter and mean summer soil temperature is more than 9°F. The mean annual summer soil temperature is higher than 47°F.

The soils in this group formed in material that weathered from granitic, basalt, metamorphic rocks, pumice, ash and tuff. The elevation ranges from 5,000 to 13,000 feet. The soils are on mountainsides, hillsides, basalt

flows, mountain toeslopes, moraines, hilltops, ridges and colluvial slopes. Slopes range from 0 to 90 percent. Annual precipitation ranges from 8 to 45 inches.

The soils in this group are shallow to very deep and are well drained to excessively drained. The plant species are big sagebrush, Jeffrey pine, red fir, lodgepole pine, singleleaf Pinyon and western juniper. The areas are used mainly for watershed, wildlife habitat, recreation, and fuelwood production.

5. Rock outcrop-Lithic Cryorthents-Corbett-Nanamkin families

The soils in this map unit formed in material that weathered from mixed granitic, rhyolitic and andesitic rocks. They are on mountainsides, ridges and colluvial slopes of slopes of 0 to 90 percent. This unit makes up about 17 percent of the survey area.

Approximately 39 percent of the map unit is Rock outcrop-Lithic Cryorthents, 18 percent is Corbett family soils and 13 percent is Nanamkin family soils. The remaining 30 percent is comprised of minor components of a variety of other family soils and rock outcrop.

Lithic Cryorthents, weathered from granitic materials are shallow, have a extremely stony loamy sand surface layer and are well drained. Corbett family soils are formed in granitic, rhyolitic and andesitic materials with a gravelly loamy sand surface layer and are somewhat excessively drained. The Nanamkin family has similar characteristics as Lithic Cryorthents and the Corbett family, but has a very cobbly loamy sand surface texture.

6. Neuske-Bearskin-Haypress families

The soils in this map unit formed in material that weathered from granitic, basalt, metasedimentary and mixed rock. They are on hillsides, basalt flows, mountain toeslopes and mountainsides, on slopes of 0 to 90 percent. This unit makes up about 7 percent of the survey area.

Approximately 23 percent of the unit is Neuske family soils, 19 percent is Bearskin family soils, 14 percent is Haypress family soils. The remaining 44 percent is comprised of a variety of other family soils and rock outcrop.

Neuske family, basaltic and mixed granitic soils are moderately deep to very deep, have a gravelly fine sandy loam and loamy coarse sand surface layer and are well drained. Bearskin family soils are formed in material weathering from basalt and metasedimentary rocks with a gravelly loamy fine sand surface layer and are shallow and well drained. Haypress family, granitic, basalt and

mixed soils are very deep, have a loamy sand surface layer and are somewhat excessively drained.

7. Vitrandic Xerorthents-Cozetica family-Vitrandic Haploxerolls

The soils in this map unit formed in material that weathered from pumice and ash. They are on hillsides, hilltops, moraines, mountain basins, mountain flats, benches, mountain toeslopes and mountainsides that have slopes of 0 to 70 percent. This unit makes up about 12 percent of the survey area.

Approximately 76 percent of the unit is Vitrandic Xerorthents, 14 percent is Cozetica family soils, and 10 percent is Vitrandic Haploxerolls.

Vitrandic Xerorthents, pumice soils are very deep, have a loamy coarse sand surface layer and are somewhat excessively drained. Cozetica family soils are formed in pumice and ash with a gravelly sand surface layer and are somewhat excessively drained. Vitrandic Haploxerolls has similar characteristics but has a gravelly coarse sand surface layer.

Soils in the Cryic Soil Temperature Regime

In the cryic soil temperature regime the mean annual soil temperature is 32 to 47°F. The mean annual summer soil temperature is lower than 47°F if a litter layer is present and the soil is not saturated during some portion of the summer and 59°F if a litter layer is not present. Conversely, if the soil is saturated for a portion of the summer then the soil temperature must be lower than 43°F if a litter layer is present and 55°F if not.

The soils in this group formed in material that weathered from granitic, basalt, metamorphic rocks, pumice, rhyolite, obsidian and ash. The elevation ranges from 7,400 to 13,400 feet. They are on mountainsides, hillsides, mountaintops, hilltops, terraces, and mountain basins. Slopes range from 0 to 70 percent. Annual precipitation ranges from 12 to 45 inches.

Associated plant species are big sagebrush, whitebark pine, red fir, lodgepole pine, Jeffrey pine, sedges and grasses. The areas are used mainly for watershed, wildlife habitat, recreation, and fuelwood production.

8. Stecum-Labshaft families

The soils in this map unit formed in material that weathered from granitic, metavolcanic, metasedimentary and mixed rocks. They are on mountainsides, mountain tops, moraines and terraces of slopes of 0 to 70 percent. This unit makes up about 8 percent of the survey area.

Approximately 69 percent of the map unit is Stecum family soils and 13 percent is Labshaft family soils. The remaining 18 percent is minor components of a variety of other family soils and rock outcrop.

The Stecum family, weathered from granitic, metavolcanic and metasedimentary materials are moderately deep to very deep, have a very cobbly loamy sand surface layer, and are somewhat excessively drained. Labshaft family soils are formed in mixed rocks with a very gravelly sandy loam surface layer and are well drained.

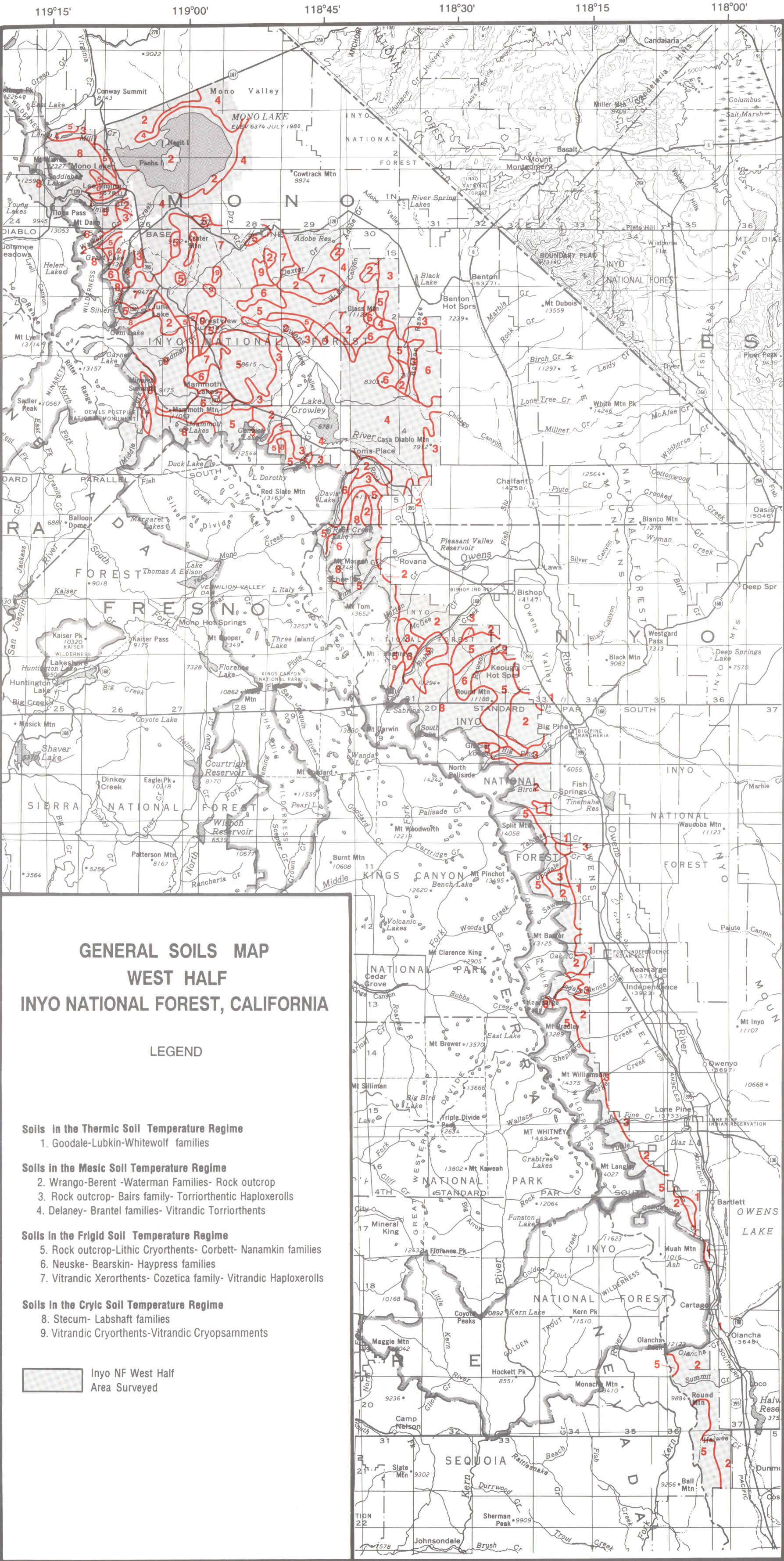
9. Vitrandic Cryorthents-Vitrandic Cryopsamments

The soils in this map unit formed in material that weathered from pumice, rhyolite and obsidian. They are on hillsides, hilltops, terraces, mountain flats, mountain benches, mountain basins and mountainsides that have slopes of 0 to 60 percent. This unit makes up about 3 percent of the survey area.

Approximately 50 percent of the unit is Vitrandic Cryorthents, and 50 percent is Vitrandic Cryopsamments.

Vitrandic Cryorthents, pumice soils are moderately deep to very deep, have a very gravelly coarse sand surface layer and are somewhat excessively drained. Vitrandic Cryopsamments soils are formed in pumice with a loamy sand surface layer and are somewhat excessively drained.

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Detailed Soil Map Units

The map units on the soil maps at the back of this report show the kind of soils in the survey area. Table 2 gives the acreage and proportionate extent of each map unit. Each map unit on the soil maps represents an area on the landscape and consists of one or more soils or miscellaneous landtypes for which the unit is named. The map unit descriptions, which are in tabular format, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They can also be used to plan the management needs for those uses.

In this survey, the individual soils (components of map units) were recognized and classified to families or phases of families or to the subgroup level (see "Classification of the Soils"). Soils that have profiles somewhat alike make up a soil family. Soil families are established within a subgroup primarily on the basis of physical and chemical properties that affect use and management. Soils of a family can also differ in slope, wetness, or degree of erosion, and because of such differences, a family is divided into soil phases.

Many map units are made up of two or more major soils. Table 4 lists for each soil, those map units in which the soil occurs as a major component. These map units are called soil complexes or soil associations. A soil complex consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. A soil association is made up of two or more geographically associated soils that are shown as one unit on the maps.

Because of present or anticipated uses, it was considered impractical to map the soils separately. In addition, some map units include miscellaneous areas as components. The Rock outcrop unit is an example; it has little or no soil and supports little or no vegetation.

Definitions and Criteria

The following are explanations of entries used in detailed soil map unit descriptions.

Map unit symbol and name. A numerical symbol is used to designate areas of each map unit on the soil maps. The symbol corresponds to the symbol preceding the map unit name in the map unit descriptions. The map unit consists of soil components or miscellaneous areas or both.

Elevation. The range of elevation (in feet) for the soil map unit.

Annual precipitation. The range of average annual precipitation (in inches) for the map unit.

Soil map unit components consist mostly of soil families but may include subgroups or higher soil taxa and miscellaneous land types.

Approximate proportion is the approximate percentage of each soil component or miscellaneous land type making up the map unit.

Landscape position describes the type of landform or surface on which the components are found.

Slope is the slope range for each soil component, expressed in percent slope.

Typical vegetation series is listed for each soil component. A series is a natural vegetation unit that has a common dominant species or set of species. Vegetation series are part of a hierarchical stratification used in the Vegetation Classification system for California (CALVEG)(4). They are:

Mixed Conifer - Fir Series - This series consists of a number of conifer species, including white fir (*Abies concolor*), red fir (*Abies magnifica*), Jeffrey pine (*Pinus jeffreyi*). These mixed conifers occur within an elevation range of (6,000 to 9,000) feet. The lower elevations within this range are primarily dominated by white fir and Jeffrey pine. In higher elevations, red fir becomes more dominant. However, Jeffrey pine and white fir continue to occur in decreasing amounts. Greenleaf manzanita (*Arctostaphylos patula*), bitterbrush (*Purshia tridentata*), and big sagebrush (*Artemisia tridentata*) are associated understory shrubs.

Jeffrey Pine Series - This Series, dominated by Jeffrey pine (*Pinus jeffreyi*) occurs in Mono County, north and south of Mono Lake, on rolling hills, lower elevation mountain uplands, and above flats. Associated vegetation are ponderosa pine (*Pinus ponderosa*), singleleaf Pinyon (*Pinus monophylla*), lodgepole pine (*Pinus contorta* var. *murrayana*), red fir (*Abies magnifica*), juniper (*Juniperus occidentalis*), big sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), and greenleaf manzanita (*Arctostaphylos patula*).

Red Fir Series - This series is within an elevational range of (6,500 feet to greater than 9,000 feet) in a band just above the Mixed Conifer - Fir Series. red fir (*Abies magnifica*) grows in pure, dense stands, but on rocky ridgetops; red fir shares dominance with lodgepole pine (*Pinus contorta* var. *murrayana*) and white fir (*Abies concolor*). Jeffrey pine (*Pinus jeffreyi*) is also an associated conifer species. In dense red

fir stands with heavy litter accumulation, understory plants do not occur. In more open stands, greenleaf manzanita (*Arctostaphylos patula*), bitterbrush (*Purshia tridentata*), and big sagebrush (*Artemisia tridentata*) are the dominant understory shrubs.

Lodgepole Pine Series - The Lodgepole Pine (*Pinus contorta* var. *murrayana*) Series occurs at elevations from 6,500 feet to greater than 10,000 feet, on frigid and cryic soils. It occurs intermingled with the Jeffrey pine, red fir, whitebark pine and Mixed Conifer Series, in dense, pure stands in swales with abundant year around moisture, or as scattered individual trees on very dry soils. Lodgepole pine (*Pinus contorta* var. *murrayana*) is an invader species, and as the microsite changes, it may be replaced by Jeffrey pine (*Pinus jeffreyi*) or red fir (*Abies magnifica*).

Whitebark Pine Series - This series, dominated by whitebark pine (*Pinus albicaulis*), occurs on high windswept ridges at treeline. In these areas, a krummholzed form is common. This Series also grows in areas of glacial scouring where development is poor. whitebark pine associates with lodgepole pine (*Pinus contorta* var. *murrayana*) and foxtail pine (*Pinus balfouriana*).

Western White Pine Series - western white pine (*Pinus monticola*) occurs in small groves on high elevation, dry, windblown slopes. On better soils, it associates with red fir (*Abies magnifica*), mountain hemlock (*Tsuga mertensiana*) and lodgepole pine (*Pinus contorta* var. *murrayana*).

Singleleaf Pinyon Series - On the dry, east slopes of the southern Sierra and north of Mono Lake, singleleaf Pinyon (*Pinus monophylla*) pine dominates in open woodlands. Associated with singleleaf Pinyon is western juniper (*Juniperus occidentalis*), Utah juniper (*J. utahensis*), and curleaf mountain mahogany (*Cercocarpus ledifolius*). Associated understory species include basin sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), and rabbitbrush (*Chrysothamnus parryi*). At low elevations of mountain areas near Lee Vining, singleleaf Pinyon becomes the sole dominant conifer.

Quaking Aspen Series - The Quaking Aspen (*Populus tremuloides*) Series occurs at high elevations as an indicator of moist conditions. Groves of quaking aspen associate with red fir (*Abies magnifica*), lodgepole pine (*Pinus contorta* var. *murrayana*), mountain hemlock (*Tsuga mertensiana*), basin sagebrush (*Artemisia tridentata*), and high elevation meadow Series. The elevational range is from (6,500 feet to 10,000 feet). At higher elevations, under exposed conditions, quaking aspen stands will maintain a shrub-like appearance and never reach a tree-like form.

Willow Series - This series, dominated by willow (*Salix spp.*), occurs on the east side of the Sierra Nevada where stream or pond conditions provide sufficient moisture. Associates of this stringer-like Series include water birch (*Betula occidentalis*), wild rose (*Rosa woodsii*), aspen (*Populus spp.*), and other water tolerant species.

Greenleaf Manzanita Series - The Greenleaf Manzanita (*Arctostaphylos patula*) Series grows at high elevations. Geographically associated Series include the Mixed Conifer - Fir, and the Red Fir Series. Greenleaf manzanita occasionally is in association with Jeffrey pine (*Pinus jeffreyi*) and lodgepole pine (*Pinus contorta* var. *murrayana*). This manzanita species sprouts after fires, and seeds are viable for many years. After a fire or disturbance, seed germination plus sprouting allows the occupancy of the site after about five years.

Saltbush Series - Both spiny saltbush (*Atriplex confertifolia*) and fourwing saltbush (*A. canescens*) occur from northern Owens Valley to Kern County. spiny saltbush generally is located on dry alkaline plains and hills on the east slopes of the Sierra Nevada in Mono, Kern, and Inyo Counties. Fourwing saltbush may be abundant on saline desert flats and washes in the same counties. Associated species include sagebrush, cresote, and grasses.

Big Sagebrush Series - Big sagebrush or basin sagebrush (*Artemisia tridentata*), the dominant of this Series, generally occurs on dry slopes and plains from (4,000 feet to 10,600 feet) east of the Sierran crest. Basin sagebrush is usually found on frigid soils with a lack of profile development. bitterbrush (*Purshia tridentata*) may occur as a codominant. Basin sagebrush also occurs with Jeffrey pine (*Pinus jeffreyi*) and mountain mahogany (*Cercocarpus ledifolius*) on gentle to steep slopes without rock outcrops. Other associates include juniper (*Juniperus spp.*), greenleaf manzanita (*Arctostaphylos patula*), rabbitbrush (*Chrysothamnus spp.*), squirreltail (*Sitanion hystrix*), fescue (*Festuca spp.*), Kentucky bluegrass (*Poa pratensis*), and sagebrush (*A. nova*, *A. arbuscula*, and *A. rothrockii*).

Low Sagebrush Series - Low sagebrush (*Artemisia arbuscula*) generally is restricted to basins with clay or saline-alkaline soils which are intermittently flooded. Low sagebrush also occurs on terraces with hardpan or heavy clay conditions. When in association with bitterbrush (*Purshia tridentata*), it reflects a mosaic of poorly drained soils, with the bitterbrush on deeper soils and low sagebrush on shallow soils. Black sagebrush (*Artemisia arbuscula nova*) also occurs on harsh sites, and is an indicator of limestone-dominated alluvial fans. Associated plants include the same species associated with the Basin Sagebrush Series.

Bitterbrush Series - In the Mono Basin, southeast of Mono Lake and in the headwaters of the Owens River, bitterbrush (*Purshia tridentata*) becomes the dominant of this Series. This high value forage species occurs at higher elevations than saltgrass (*Distichlis spp.*) meadows and below montane slopes with basin sagebrush (*Artemisia tridentata*), Pinyon pine (*Pinus monophylla*), and juniper (*Juniperus spp.*). Bitterbrush may also be locally dominant when associated with basin sagebrush.

Curlleaf Mountain Mahogany Series - This Series occurs on gently to steeply sloping mountain uplands and ridgetops, usually in association with rock outcrops. On more xeric sites, curlleaf mountain mahogany (*Cercocarpus ledifolius*) occurs in association with manzanita (*Arctostaphylos spp.*), Idaho fescue (*Festuca idahoensis*), squirreltail (*Sitanion hystrix*), and a few other grasses and forbs. On more mesic sites, associates may include juniper (*Juniperus spp.*), scattered Jeffrey pine (*Pinus jeffreyi*), or singleleaf Pinyon (*Pinus monophylla*). This Series may occur in two forms; a shrub form that occurs scattered throughout an area, and a small tree form that occurs in dense thickets.

Shadscale Series - Shadscale (*Atriplex confertifolia*) dominates throughout basins of the Mojave Desert, and in valleys southeast of Mono Lake. These basins form pluvial lakes or dry lakes with salt accumulations. Associated species include bud sagebrush (*Artemisia spinescens*), big sagebrush (*Artemisia tridentata*), Nevada ephedra (*Ephedra Nevadensis*), allscale (*Atriplex polycarpa*), Iodine bush (*Allenrolfea occidentalis*), and greasewood (*Sarcobatus vermiculatus*). Shadscale and bud sage are common associates in the Owens Valley.

Blackbush Series - This series sometimes called Blackbrush (*Coleogyne ramosissima*), dominates within the Mojave Desert and adjacent montane slopes. Occurrence is on non-saline soils, often beneath scattered Pinyon pine (*Pinus monophylla*). Associated species include hopsage (*Grayia spinosa*), agave (*Agave deserti*), and Mormon tea (*Ephedra spp.*).

Perennial Grass Series - Within the Jeffrey pine, red fir and lodgepole pine forests, perennial grasses dominate the openings of poorly developed, drier soils. Many grasses make up this Series (*Poa spp.*, *Bromus tectorum*, *Bromus spp.*, and *Elymus spp.*). Forbs are also included in this highly diverse Series.

On pumice flats in Mono County, perennial dominants include needlegrass (*Stipa elmeri*), squirreltail (*Sitanion spp.*), bluegrass (*Poa spp.*), bentgrass (*Agrostis spp.*), brome grass (*Bromus spp.*), lupine (*Lupinus duranii*), pussy paws (*Calyptidium umbellatum* var. *caudiciferum*), Hulsea (*Hulsea vestita*), and evening primrose

(*Oenothera xylocarpa*). This series commonly is bordered by the basin sagebrush Series and may include some of its components.

Sedge - Rush Series - This Series is composed of sedges (*Carex spp.*) and rushes (*Juncus spp.*) and designates year-long water availability. Perennial grasses, forbs, willows, and lodgepole pine may be associated with the Sedge - Rush Series. This Series represents a much wetter site that does the Perennial Grass Series.

Pickleweed Series - Pickleweed (*Salicornia utahensis*) occurs as a dominant adjacent to alkali sinks and in flats above alkali lakes east of the Sierra Nevada. Associated species in the playas and sinks include arrowweed (*Pulchella sericea*), greasewood (*Sarcobatus spp.*), and sea-blite (*Suaeda spp.*).

Soil profile description is an abridged version of the more detailed soil profile descriptions in the section "Taxonomic Unit Descriptions". This description combines horizons and includes the thickness, dry color, texture, structure, dry consistence, rock fragment content and reaction (pH). Miscellaneous landtypes are also described here. Included are the following layers:

Surface Layer. The uppermost part of the soil, ordinarily removed in tillage, or its equivalent in uncultivated soils. Frequently designated the "A horizon".

Subsoil. The soil between the surface layer and the uppermost substratum. The subsoil consists of all parts of the B horizon above a depth of two meters (80 inches) and any part of the A or C horizon between the surface layer and a depth of one meter (40 inches) or a more shallow substratum.

Substratum. A layer below a depth of one meter (40 inches), or beneath the solum if the lower part of the solum is between one and two meters (40 to 80 inches) deep. Any part of the solum below two meters (80 inches) is considered substratum. Bedrock, hardpan, and unconsolidated geologic materials that are in contrasting particle-size classes relative to the surface soil or solum are substratum regardless of depth, even within one meter of the ground surface.

Included Areas comprise the other kinds of soils in the map unit that are not named as a component part because they constitute too small a percentage of the unit. Included areas are identified because some do affect management significantly and the recognition of all of them will assist with more detailed mapping in the future.

Management Interpretations

The following are explanations used in the management interpretations for detailed soil map unit descriptions.

Restrictive Layer depth is a restrictive layer which occurs within the upper 60 inches of the soil profile. Restrictive layers impede or stop downward water movement and root penetration. Types of restrictive layers in this report are: duripan or hardpan (DP), fractured bedrock (FB), hard unfractured bedrock (HB) and parialithic contact (PC).

Effective rooting depth is the depth to which a soil is readily penetrated by roots and used for extraction of water and plant nutrients. The classes of effective rooting depth are:

Very Shallow	0 to 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	greater than 60 inches

Available water capacity (AWC) is the capacity of the soil to store water for use by most plants. It commonly is defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is expressed as total inches of water within the effective rooting depth or to a depth of 60 inches. The following four classes of AWC are used in this survey:

Very low	to 2 inches
Low	2 to 4 inches
Moderate	4 to 8 inches
High	more than 8 inches

Water retention class is based on the available water capacity for plants of a typical soil profile to a depth of 20 inches or to bedrock, whichever is less. This moisture content is used in evaluating soils for revegetation according to the probability of survival of seedlings.

There are three water retention classes. The soils in class 1 have an available water capacity of more than 2.4 inches. Plantings on these soils have a high probability of survival. The soils in class 2 have an available water capacity of 1.2 to 2.4 inches. Some problems will be encountered in establishing plantings. The soils in class 3 have an available water capacity of less than 1.2 inch. Plantings on these soils have little chance of success unless intensive management or mitigation measures are applied.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned one of four groups. The soils are grouped according to the intake of water when they are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Low runoff potential. Soils having high rates of infiltration and water transmission when wet. They are mostly deep, well drained to excessively drained sands and gravel.

Group B. Moderately low runoff potential. Soils having moderate rates of infiltration and water transmission when wet. They are mostly moderately-deep to deep, moderately well-drained and well-drained soils, moderately fine to moderately coarse-textured and have moderately slow to moderately rapid permeability.

Group C. Moderately high runoff potential. Soils having slow rates of infiltration and water transmission when wet. They belong mostly to one of two categories. Those in the first category are mostly well drained and moderately well drained soils that have a slowly or very slowly permeable layer (such as claypan or hardpan or massive bedrock) at moderate depth (20-40 inches). Those soils in the second category generally have moderately fine or fine textures or a moderately high water table and may be somewhat poorly drained. This group also includes shallow soils over hard but highly fractured bedrock that allows moderate water transmission.

Group D. High runoff potential. Soils having very slow rates of infiltration and water transmission when wet. They are mostly fine-textured soils that have high shrink-swell potential, soils that have a permanently high water table, soils that have a claypan or a clay layer near the surface, or shallow soils over impervious material.

Some of the soil subgroups (for example, C-B for Lithic Cryorthents) were given two ratings because of their wide range of characteristics.

Permeability is the quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. The measure here is based on the least pervious soil horizon. Terms describing permeability are: Very slow (less than 0.06 inch), slow (0.06 to 0.20 inches), moderately slow (0.2 to 0.6 inches), moderate (0.6 to 2.0 inches),

moderately rapid (2.0 to 6.0 inches), rapid (6.0 to 20.0 inches), and very rapid (more than 20.0 inches).

Drainage class refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation, but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized.

Excessively drained. Water is removed from the soil very rapidly. Excessively drained soils commonly are very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained. Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained. Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils commonly are medium textured. They are mainly free of mottling.

Moderately well drained. Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. The soils commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained. Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained. Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, or nearly continuous rainfall, or a combination of these.

Very poorly drained. Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Very poorly drained soils commonly are level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Maximum Erosion Hazard

Many land use activities have the potential to cause erosion rates to exceed natural soil erosion or soil formation rates. Potential consequences of accelerated erosion include reductions in the productive capacity of the soil and adverse effects on water quality. Many interrelated factors are evaluated in an EHR system to determine whether land use activities would cause accelerated erosion, and to what degree accelerated erosion would cause adverse effects. It is designed to appraise the relative risk of accelerated sheet and rill erosion. The system does not rate gully erosion, dry ravel, wind erosion, nor mass wasting.

The adjective erosion hazard ratings are described below in terms of the likelihood and consequences of accelerated erosion. As the risk of accelerated erosion increases, so does the likelihood that accelerated erosion will exceed soil formation rates. The risk and consequence becomes especially critical for shallow and moderately deep soils over consolidated materials.

The maximum EHR are based on little or no vegetative cover present and on the long-term average occurrence of 2-year, 6-hour storm events. Erosion hazard risks are greater when storm frequency, intensity and/or duration exceed long-term average occurrence, and risks are less when occurrence is below "average". The risks and consequences for adjective erosion hazard ratings are described below.

Low EHR. Accelerated erosion is not likely to occur, except in the upper part of the Low EHR numerical range, or during periods of above average storm occurrence. If accelerated erosion does occur, adverse effects on soil productivity and to nearby water quality are not expected. Erosion control measures are usually not needed for these areas.

Moderate EHR. Accelerated erosion is likely to occur in most years. Adverse effects on soil productivity (especially to shallow and moderately deep soils) and to nearby water quality may occur for the upper part of the Moderate EHR numerical range, or during periods of above average storm occurrence. The need for erosion control should be evaluated

for these areas. A wide selection of measures and application methods are available.

High EHR. Accelerated erosion will occur in most years. Adverse effects on soil productivity (especially to shallow and moderately deep soils) and to nearby water quality are likely to occur, especially during periods of above average storm occurrence. Erosion control is necessary for these areas to prevent accelerated erosion. The selection of measures and methods of application are somewhat limited.

Very high EHR. Accelerated erosion will occur in most years. Adverse effects on soil productivity and to nearby water quality are very likely to occur, even during periods of below average storm occurrence. Erosion control is essential for these areas to prevent accelerated erosion. The selection of measures and methods of application are limited.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on the percentage of silt, sand and organic matter (up to 4 percent) and on the soil structure and permeability. Values of K in the survey area range from 0.05 to 0.37. A higher the value for a soil, the more susceptible the soils is to sheet and rill erosion by water.

Soil productivity signifies the assessed ability of soils to supply essential nutrients for plant growth. Current knowledge of critical or threshold nutrient levels for native species is incomplete. The soil criteria used to make these ratings are: soil depth, presence or absence of a mollic epipedon, particle-size class, mineralogy, and reaction classes. The ratings are: very low, low, moderate, and high.

Soil manageability. Certain features of the land affect the relative ease of management with mechanized equipment. Soil manageability classification rates soils and their topography on the basis of features that reduce the ease of equipment operations and features that increase the need for soil protection measures.

Soil manageability classes are ratings that are applied to the individual components of a soil map unit. Manageability classes are useful for providing specific information about individual soils. Because map units may contain soils with contrasting class ratings, soil manageability groups are used to provide general ratings that apply to an entire map unit. Manageability groups are useful for providing general information for large areas.

Soil manageability classes are represented by the numerals 1 to 4. Class 1 is the easiest to manage and class 4 is the most difficult. Letter symbols are added to classes 2, 3, and 4 to identify specific soil problems affecting management. Soil manageability classes are described as follows:

Class 1 - Easy to manage. Soils in this class are on stable slopes with gradients ranging up to about 30 percent. They are moderately deep or deep and do not have more than slight management problems. No management option modifiers apply to this class.

Class 2 - Readily manageable. Soils in this class are mostly on slopes of less than 30 percent and have one or more moderate management limitations, such as a moderate erosion hazard.

Class 3 - Moderately difficult to management. Soils in this class are on steep slopes that are mostly between 30 and 60 percent, or they have a major management limitation, or both.

Class 4 - Very difficult to manage. Soils in this class are on very steep slopes (more than 60 percent), or they have two or more other major management limitations.

Letter symbols are used to express the severity of potential problems in soil management. Major management option modifiers are identified by capital letters and moderate management modifiers are indicated by lowercase letters. The criteria and symbols for management option modifiers for each soil characteristic or topographic feature are listed in table 1.

TABLE 1. - Soil Features Affecting Management

Soil features	Major modifiers	Moderate modifiers
Slope gradient	G...Mostly more than 60 percent	g...Mostly between 30 and 60 percent
Slope stability	S...Low	s...Moderate
Maximum erosion hazard	E...High or very high	e...Moderate
Soil Depth	D...Less than 10 inches	d...10 to 20 inches
AWC, upper 20 inches	P...Less than 1.2 inches	p...1.2 to 2.4 inches
Wetness	W...Poorly drained	w...Somewhat poorly drained
Rock outcrop or surface boulders	X...More than 15 percent of surface area	x...3 to 15 percent of surface area

Management option modifiers are chosen in the order in which they are listed. More than one symbol can be chosen from each of the following groups: (1) symbols G, S, and E (and their lower case forms); (2) symbols D and P; and (3) symbols W and X. Within each group, symbols for major management limitations take precedence over moderate limitations.

Soil manageability groups are defined by the mix of soil manageability classes that occurs in a soil map unit. They are designated by Roman numerals to distinguish them from soil manageability classes. Only one group applies to a soil map unit, whereas as many classes may apply as there are major components in the map unit. Table 1 displays soil features affecting management and the soil manageability groups in the survey area are defined.

Group I - Map unit is predominantly class 1. Less than 20 percent of the unit is class 3 or class 4. The unit may be no more than 50 percent class 2, or combinations of classes 2, 3, and 4.

Group II - Map unit is predominantly class 2. Less than 20 percent of the unit is class 4. Less than 50 percent of the unit is class 3 or a combination of classes 3 and 4.

Group III - Map unit is predominantly class 3. Less than 40 percent of the unit is class 4.

Group IV - Map unit is at least 40 percent class 4.

A soil map unit is placed in the group with the lowest numeral if group definitions allow the unit to be placed in more than one soil manageability group.

Annual forage production is an estimate of the total annual production of forage grasses in pounds per acre (air-dry weight). The estimates generally are based on professional judgement because little if any field data or yield studies were available. These estimates can be verified through project monitoring activities and ecosystem classification.

Forest survey site class - the timber productivity of the soil components is expressed by the Forest Survey Site Class (FSSC). The FSSC estimated for each soil component is an average over the map unit. Site index values were obtained by using available site index data and appropriate guides for converting into FSSC.

On a specific site in the map unit, FSSC might be more or less than what is given in the report. FSSC is an expression of the volume of bole wood produced on an acre in one year in a normal even-aged stand

at culmination mean annual increment. Below are the seven FSSC's and their corresponding volume in cubic feet per acre:

1	greater than 225	5	50 to 85
2	165 to 225	6	20 to 50
3	120 to 165	7	less than 20
4	85 to 120		

The term NC means not capable of growing commercial conifer species.

Remarks - Comments unique to the map unit, important to the management of the map unit, or that add further explanation to something previously stated in this section.

TABLE 2. - Acreage and Proportionate Extent of the Map Units

Map Symbol	Map Unit Name	Percent of Survey area	Acres
101	Vitrantic Cryorthents, ashy - Vitrantic Xerorthents, - Rock outcrop complex, 30 to 60 percent slopes	0.36	2,841
105	Vitrantic Haploxerolls, 0 to 15 percent slopes	0.22	1,766
106	Vitrantic Xeropsamments, 30 to 60 percent slopes	0.28	2,211
107	Vitrantic Xeropsamments, warm - Vitrantic Xeror- thents, ashy, warm complex, 0 to 15 percent slopes	0.32	2,583
108	Chesaw - Railcity families - Rock outcrop complex, 15 to 60 percent slopes	0.42	3,326
110	Biglake - Chesaw families - Rock outcrop complex, 15 to 60 percent slopes	0.14	1,041
111	Vitrantic Xeropsamments - Corbett family - Rock outcrop complex, 15 to 30 percent slopes	0.31	2,460
114	Haypress family - Rock outcrop association, 30 to 60 percent slopes	0.50	3,960
115	Vitrantic Haploxerolls, - Vitrantic Xerorthents, ashy, warm complex, 15 to 30 percent slopes	0.30	2,350
116	Haypress family, 0 to 15 percent slopes	0.08	655
117	Rock outcrop - Rubbleland complex	6.58	52,104
121	Vitrantic Haploxerolls, - Vitrantic Xeropsamments, warm complex, 15 to 30 percent slopes	0.35	2,810
122	Vitrantic Xerorthents, ashy - Vitrantic Xeropsamments - Vitrantic Cryorthents, ashy complex, 0 to 15 percent slopes	1.77	14,026
124	Vitrantic Xerorthents, pumiceous, warm - Vitrantic Haploxerolls, pumiceous - Vitrantic Xerorthents, ashy, warm complex, 0 to 15 percent slopes	0.53	4,204
126	Vitrantic Cryorthents, pumiceous - Vitrantic Cryorthents - Vitrantic Xerorthents, pumiceous complex, 0 to 15 percent slopes	0.50	3,961
127	Vitrantic Cryorthents, pumiceous - Vitrantic Cryorthents complex, 15 to 30 percent slopes	0.24	1,915
131	Corbett family - Vitrantic Xeropsamments, warm - Rock outcrop complex, 15 to 30 percent slopes	0.38	3,044
132	Corbett - Railcity families - Rock outcrop complex, 30 to 60 percent slopes	1.60	12,575
133	Corbett family - Rock outcrop - Railcity family complex, 15 to 30 percent slopes	0.46	3,673
134	Vitrantic Xeropsamments, warm, 0 to 15 percent slopes	0.44	3,474
136	Vitrantic Cryopsamments, 0 to 15 percent slopes	0.29	2,277
137	Vitrantic Xerorthents, pumiceous, warm - Vitrantic Xerorthents, complex, 0 to 30 percent slopes	1.00	7,851
138	Vitrantic Xerorthents, pumiceous - Vitrantic Xeropsamments - Rock outcrop complex, 30 to 60 percent slopes	1.07	8,511
139	Brantel family, 0 to 15 percent slopes	2.60	20,569
140	Cozetica family - Rock outcrop association, 15 to 60 percent slopes	1.41	11,194

Map Symbol	Map Unit Name	Percent of Survey area	Acres
142	Brantel family - Rock outcrop complex, 0 to 30 percent slopes . . .	0.62	4,899
143	Vitrantic Xerorthents, pumiceous - Vitrantic Xeropsamments complex, 0 to 15 percent slopes	0.33	2,588
144	Cozetica family, 0 to 30 percent slopes	0.17	1,295
145	Vitrantic Xeropsamments, warm - Vitrantic Xerorthents, ashy, warm - Vitrantic Cryorthents, ashy complex, 0 to 30 percent slopes	0.70	5,518
146	Lakash - Brantel families complex, 0 to 15 percent slopes	1.33	10,579
148	Stecum - Salt Chuck families complex, 30 to 75 percent slopes . .	0.44	3,495
149	Nanamkin family - Vitrantic Haploxerolls complex, 15 to 30 percent slopes	0.05	407
150	Vitrantic Cryopsamments - Vitrantic Cryorthents, ashy complex, 9 to 30 percent slopes	0.44	3,493
151	Vitrantic Xeropsamments, warm - Rock outcrop complex, 15 to 60 percent slopes	0.60	4,751
152	Vitrantic Cryopsamments - Rock outcrop complex, 15 to 30 percent slopes	0.35	2,816
153	Vitrantic Cryopsamments - Rock outcrop complex, 30 to 60 percent slopes	0.26	2,021
154	Vitrantic Cryorthents, pumiceous - Vitrantic Cryorthents - Rock outcrop complex, 30 to 60 percent slopes	0.33	2,587
155	Aquandic Endoaquolls, 0 to 5 percent slopes	0.04	363
156	Charcol - Cowood families complex, 2 to 30 percent slopes	0.07	607
157	Stecum - Guiser families - Rock outcrop complex, 15 to 60 percent slopes	0.69	5,493
158	Stecum - Charcol families - Rock outcrop complex, 30 to 70 percent slopes	0.73	5,865
159	Aquic Cryoborolls, 5 to 30 percent slopes	0.03	231
160	Haypress family, 30 to 60 percent slopes	0.26	2,046
161	Torriorthentic Haploxerolls, 2 to 30 percent slopes	0.37	2,946
162	Torriorthentic Haploxerolls - Rock outcrop complex, 2 to 15 percent slopes	0.07	584
163	Yellowhills - Brantel families complex, 2 to 5 percent slopes	0.22	1,745
164	Vitrantic Xerochrepts - Rock outcrop complex, 30 to 60 percent slopes	0.10	819
169	Vitrantic Xerofluvents, 0 to 15 percent slopes	0.03	259
170	Springmeyer family, 30 to 60 percent slopes	0.01	122
171	Sumine family - Rock outcrop complex, 2 to 30 percent slopes . .	0.26	2,010
172	Calpine - Mottsville families association, 2 to 30 percent slopes	0.15	1,171
173	Fez family - Vitrantic Xeropsamments complex, 30 to 60 percent slopes	0.22	1,728
174	Torriorthentic Haploxerolls - Rock outcrop complex, 30 to 60 percent slopes	0.35	2,819
175	Calpine family, 5 to 30 percent slopes	0.19	1,500
176	Calpine family - Rock outcrop complex, 0 to 15 percent slopes . .	0.22	1,709
177	Torriorthentic Haploxerolls - Mottsville family association, 15 to 60 percent slopes	0.20	1,553

Map Symbol	Map Unit Name	Percent of Survey area	Acres
200	Nanamkin family, 2 to 60 percent slopes	0.19	1,433
201	Rubbleland - Stecum family - Lithic Cryorthents association, 30 to 80 percent slopes	0.16	1,305
203	Chesaw family, 60 to 80 percent slopes	0.01	75
204	Nanamkin - Corbett families association, 30 to 60 percent slopes	0.05	447
205	Rubbleland - Nanamkin - Glean families complex, 30 to 80 percent slopes	0.05	414
206	Stecum - Charcol families - Rock outcrop association, 2 to 50 percent slopes	0.03	222
213	Stecum family - Rubbleland complex, 15 to 60 percent slopes	0.14	1,036
215	Glean family, 0 to 50 percent slopes	0.16	1,263
216	Railcity family - Rock outcrop complex, 2 to 15 percent slopes	0.05	419
217	Nanamkin family - Rubbleland complex, 60 to 80 percent slopes	0.02	160
218	Rock outcrop - Railcity family association, 30 to 90 percent slopes	0.02	128
301	Neuske family, 15 to 30 percent slopes	0.08	620
302	Rock outcrop - Abgese - Pass Canyon families complex, 15 to 30 percent slopes	0.11	887
303	Rock outcrop - Abgese - Pass Canyon families complex, 30 to 60 percent slopes	0.72	5,682
304	Rock outcrop - Abgese - Pass Canyon families complex, 60 to 90 percent slopes	0.24	1,862
305	Delaney family - Rock outcrop complex, 0 to 30 percent slopes	0.34	2,674
306	Delaney family - Rock outcrop complex, 30 to 60 percent slopes	0.58	4,536
307	Vitrantic Xeropsamments, warm, 15 to 30 percent slopes	0.23	1,843
308	Vitrantic Xerorthents - Vitrantic Xerorthents, ashy complex, 30 to 60 percent slopes	1.10	8,689
309	Vitrantic Xeropsamments, 15 to 30 percent slopes	0.30	2,414
310	Brantel family, 30 to 60 percent slopes	0.34	2,671
311	Vitrantic Xeropsamments - Rock outcrop complex, 30 to 60 percent slopes	0.89	7,083
312	Wrango - Atter families complex, 30 to 60 percent slopes	0.05	401
313	Wrango - Atter families complex, 60 to 90 percent slopes	0.34	2,680
314	Rock outcrop - Vitrantic Torriorthents, gravelly complex, 30 to 60 percent slopes	0.53	4,178
315	Brantel family - Rock outcrop complex, 30 to 60 percent slopes	0.06	473
316	Delaney family - Rock outcrop - Vitrantic Torriorthents, ashy complex, 0 to 30 percent slopes	3.16	25,057
317	Vitrantic Torriorthents, gravelly - Brantel family complex, 2 to 30 percent slopes	1.65	13,057
318	Fez family, 2 to 15 percent slopes	0.01	512
319	Waterman - Sur families - Rock outcrop complex, 15 to 30 percent slopes	0.02	1,258
320	Waterman - Sur families - Rock outcrop complex, 30 to 60 percent slopes	1.74	13,797
321	Yellowhills family, 2 to 15 percent slopes	0.55	4,332
322	Berent family, 15 to 30 percent slopes	0.09	726
323	Nanamkin - Bearskin families association, 0 to 30 percent slopes	0.11	937

Map Symbol	Map Unit Name	Percent of Survey area	Acres
324	Fez family - Vitrandic Xeropsamments complex, 0 to 30 percent slopes	0.39	3,069
325	Pass Canyon - Jaybee families - Rock outcrop complex, 15 to 60 percent slopes	0.52	4,092
326	Basket - Mascamp families complex, 30 to 60 percent slopes . . .	0.53	4,202
327	Wrango family - Rock outcrop complex, 15 to 30 percent slopes . .	0.39	3,087
328	Wrango family - Torriorthentic Haploxerolls complex, 0 to 15 percent slopes	4.68	37,083
329	Wrango family - Torriorthentic Haploxerolls complex, 15 to 30 percent slopes	1.21	9,590
330	Wrango family - Torriorthentic Haploxerolls complex, 30 to 60 percent slopes	0.15	1,114
331	Koehler - Stacy families complex, 0 to 15 percent slopes	0.22	1,703
332	Biglake family, 0 to 15 percent slopes	0.10	817
333	Bearskin family - Rock outcrop complex, 0 to 30 percent slopes . .	0.40	3,148
334	Rock outcrop - Bearskin family complex, 60 to 90 percent slopes . .	0.26	2,030
335	Neuske - Basket families complex, 30 to 60 percent slopes	1.30	10,282
336	Credo - Mascamp families complex, 15 to 60 percent slopes	0.30	2,403
337	Vitrandic Xerorthents - Vitrandic Xeropsamments complex, 30 to 70 percent slopes	1.73	13,727
338	Ola - Glean families complex, 15 to 30 percent slopes	0.37	2,988
339	Wrango family - Rock outcrop complex, 30 to 60 percent slopes . .	0.17	1,312
340	Salt Chuck family - Rock outcrop complex, 30 to 60 percent slopes	0.28	2,201
341	Delaney - Berent families - Rock outcrop complex, 15 to 60 percent slopes	0.72	5,716
342	Lithic Cryorthents - Stecum family - Rock outcrop complex, 30 to 60 percent slopes	0.26	2,079
343	Preston - Pass Canyon families association, 30 to 60 percent slopes	0.90	7,161
344	Vitrandic Xerorthents, ashy - Rock outcrop complex, 15 to 30 percent slopes	0.07	607
345	Corbett - Nanamkin families - Rock outcrop complex, 30 to 60 percent slopes	0.23	1,772
346	Atter family, 15 to 60 percent slopes	0.55	4,332
347	Nanamkin family - Rock outcrop complex, 15 to 60 percent slopes . .	1.44	11,380
348	Kilburn family, 5 to 30 percent slopes	0.25	2,007
349	Rock outcrop - Biglake family complex, 30 to 70 percent slopes . .	0.32	2,550
350	Sur - Kiona families complex, 15 to 60 percent slopes	0.74	5,845
351	Mottsville family, 0 to 15 percent slopes	0.06	500
352	Rock outcrop - Biglake - Salt Chuck families complex, 30 to 60 percent slopes	0.43	3,431
353	Wrango - Berent families - Rock outcrop association, 30 to 60 percent slopes	1.63	12,925
354	Berent family - Rock outcrop complex, 30 to 60 percent slopes . .	0.43	3,414
355	Kilburn - Nanamkin families association, 5 to 15 percent slopes . .	0.37	2,922
356	Kilburn - Nanamkin families association, 15 to 30 percent slopes	0.15	1,162

Map Symbol	Map Unit Name	Percent of Survey area	Acres
357	Jaybee family, 9 to 30 percent slopes	0.04	337
358	Rock outcrop - Wrango family complex, 60 to 90 percent slopes	0.08	663
359	Rock outcrop - Powment family complex, 30 to 60 percent slopes	0.44	3,461
360	Rock outcrop - Powment family complex, 60 to 90 percent slopes	0.99	7,831
361	Wrango - Berent families complex, 2 to 30 percent slopes	0.19	1,485
362	Berent family - Xeric Torriorthents complex, 30 to 60 percent slopes	0.80	6,322
363	Garlet - Cowood families - Rock outcrop association, 15 to 60 percent slopes	0.49	3,841
364	Preston family - Rock outcrop complex, 30 to 60 percent slopes	0.15	1,154
365	Stecum - Garlet families association, 5 to 30 percent slopes	0.41	3,257
366	Stecum family - Rock outcrop complex, 2 to 30 percent slopes	0.22	1,790
367	Stecum family - Rock outcrop complex, 30 to 60 percent slopes	1.84	14,549
368	Bearskin - Mascamp families complex, 15 to 30 percent slopes	0.48	3,787
369	Rock outcrop - Lithic Cryorthents - Nanamkin family association, 15 to 60 percent slopes	5.80	46,023
370	Kiona family - Rock outcrop complex, 5 to 30 percent slopes	0.64	5,045
371	Labshaft - Salt Chuck families - Rock outcrop complex, 15 to 60 percent slopes	0.44	3,446
372	Powment - Nanamkin families - Rock outcrop association, 30 to 60 percent slopes	1.27	10,064
373	Labshaft family - Rock outcrop complex, 30 to 60 percent slopes	0.47	4,000
374	Aquic Haploxerolls, 0 to 9 percent slopes	0.32	2,538
375	Deepwell family - Vitrandic Torripsamments association, 2 to 30 percent slopes	0.80	6,319
376	Playa	0.92	7,330
377	Sonoma - Poole families complex, 0 to 2 percent slopes	0.49	3,856
378	Dechambeau - Orecart families complex, 1 to 15 percent slopes	0.27	2,169
379	Alamedawell - Deepwell families complex, 2 to 15 percent slopes	0.16	1,238
380	Vitrandic Torriorthents, ashy - Vitrandic Haplodurids complex, 0 to 2 percent slopes	0.30	2,381
381	Poole family - Aeric Endoaquents complex, 0 to 2 percent slopes	0.39	3,086
382	Brantel - Poole families complex, 0 to 5 percent slopes	0.33	2,625
383	Orecart - Deepwell families association, 2 to 15 percent slopes	0.32	2,558
384	Cumulic Haploxerolls - Typic Fluvaquents association, 0 to 9 percent slopes	0.02	140
385	Vitrandic Torriorthents, sodic, 0 to 9 percent slopes	0.22	1,758
386	Avalmount family - Rock outcrop complex, 5 to 30 percent slopes	0.09	758
387	Garlet - Stecum families complex, 2 to 15 percent slopes	0.10	827
400	Goodale - Cartago families complex, 5 to 15 percent slopes	0.31	2,463
401	Taboose family - Lava flows complex, 5 to 30 percent slopes	0.07	611
402	Bairs family, 15 to 50 percent slopes	0.93	7,358
403	Whitewolf - Toquerville families association, 5 to 60 percent slopes	0.27	2,128
404	Arizo - Cajon families complex, 0 to 15 percent slopes	0.09	742
405	Lubkin - Tinemaha - Spainhower families complex, 5 to 15 percent slopes	0.27	2,143
406	Artray - Chesaw families complex, 0 to 5 percent slopes	0.22	1,766

Map Symbol	Map Unit Name	Percent of Survey area	Acres
407	Xerofluvents, 0 to 5 percent slopes	0.01	66
408	Dechambeau family, 2 to 5 percent slopes	0.03	274
409	Artray family, 2 to 9 percent slopes	0.01	97
410	Watterson family - Torriorthentic Haploxerolls complex, 5 to 15 percent slopes	0.18	1,451
411	Sherwin - Buscones families complex, 0 to 15 percent slopes	0.34	2,729
412	Rock outcrop - Buscones family complex, 0 to 15 percent slopes	0.04	333
413	Wrango - Pizona families complex, 5 to 30 percent slopes	0.33	2,650
---	Water	5.30	41,292
---	Unmapped (Other lands)	4.47	34,614

**101 - Vitrandic Cryorthents, ashy - Vitrandic Xerorthents - Rock outcrop complex,
30 to 60 percent slopes**

Elevation: 8,200 to 9,400 feet

Annual Precipitation: 15 to 45 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

**Vitrandic Cryorthents,
ashy**

35 percent

Mountainsides

30 to 60 percent

Red Fir

Vitrandic Xerorthents

20 percent

Mountainsides and Benches

30 to 60 percent

Red Fir

**Rock outcrop,
rhyolitic**

15 percent

Mountainsides and Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 7 inches; grayish brown & pale brown gravelly sand; massive; soft; pH 6.0

1 to 0 inch; decomposing Red Fir & Jeffrey Pine needles, twigs & small branches

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 4 inches; brown & pinkish gray extremely gravelly loamy sand; massive; soft; pH 5.5

Subsoil

—

—

—

Substratum

7 to 60 inches; light gray & white fine sand, sand, gravelly & extremely gravelly coarse sand; massive; pH 6.0 to 7.0

4 to 60 inches; very pale brown & brown extremely gravelly coarse sand; single grain; loose; pH 5.0 to 6.0

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (3.4 inches)

Very Low (0.8 inches)

—

Water Retention Class

2 (1.5 inches)

3 (0.3 inches)

—

Hydrologic Soil Group

A

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

Somewhat Excessively

—

Max Erosion Hazard

Moderate to High

Moderate to High

—

Erosion Factor (k)

0.15

0.10

—

Soil Productivity

Low

Very Low

—

Soil Manageability

Group

III

IV

—

Class

3Egp

4EPg

—

Annual Forage Production (lb/acre)

200 to 400

< 200

—

Forest Survey Site Class

5-7

5-7

—

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xeropsamments, 15 to 30 percent slopes, on some southerly and westerly-facing mountain benches; Vitrandic Cryorthents, Vitrandic Xerorthents ashy & Vitrand Cryopsamments. Included areas make up approximately 30 percent of the map unit area.

105 - Vitrandic Haploxerolls, 0 to 15 percent slopes

Elevation: 7,400 to 8,000 feet

Annual Precipitation: 12 to 15 inches

Soil Map Unit Components

Approx Proportion

Vitrandic Haploxerolls, warm

75 percent

Landscape Position

Low Hillsides

Slope

0 to 15 percent

Typical Vegetation

Jeffrey Pine

Soil Profile Description

Surface Layer

1/4 to 0 inch; decomposing Big Sagebrush & Bitterbrush plant parts

0 to 10 inches; grayish brown gravelly coarse sand & loamy coarse sand; single grain & massive; loose & soft; pH 6.5

Subsoil

—

Substratum

10 to 60 inches; light brownish gray, pinkish gray & pale brown gravelly coarse sand & loamy coarse sand; massive; soft; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.4 inches)

Water Retention Class

3 (1.1 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low

Erosion Factor (k)

0.10

Soil Productivity

Low to Moderate

Soil Manageability

Group

III

Class

3P

Annual Forage Production (lb/acre)

300 to 500

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Haypress family, in valley bottoms, Vitrandic Xerorthents, warm, & Vitrandic Haploxerolls, pumiceous. Included areas make up approximately 25 percent of the map unit area.

106 - Vitrandic Xeropsamments, 30 to 60 percent slopes

Elevation: 7,900 to 8,700 feet

Annual Precipitation: 15 to 30 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Xeropsamments

75 percent

Mountainsides

30 to 60 percent

Red Fir

Soil Profile Description

Surface Layer

2 to 0 inch; decomposing Fir & Jeffrey Pine needles & twigs

0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 5.6

Subsoil

—

Substratum

7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (4.4 inches)

Water Retention Class

2 (1.4 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Erosion Factor (k)

0.15

Soil Productivity

Low

Soil Manageability

Annual Forage Production (lb/acre)

200 to 400

Forest Survey Site Class

4-6

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xeropsamments, 15 to 30 percent slopes, on toeslope Vitrandic Xerorthents & the Chesaw family. Included areas make up approximately 25 percent of the map unit area.

**107 - Vitrandic Xeropsamments, warm - Vitrandic Xerorthents, ashy, warm complex,
0 to 15 percent slopes**

Elevation: 7,200 to 8,300 feet

Annual Precipitation: 12 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Xeropsamments, warm

50 percent

Mountain Sand Flats, Terraces & Depressions

0 to 15 percent

Big Sagebrush

Vitrandic Xerorthents, ashy, warm

25 percent

Mountain Flats & Basins

0 to 15 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 1 inch; grayish brown loamy fine sand; massive; soft; pH 6.0

1/8 to 0 inch; decomposing Jeffrey Pine needles & Bitterbrush plant parts

Subsoil

—

—

Substratum

1 to 60 inches; light brownish gray & light gray very gravelly & gravelly coarse sand; massive; soft; pH 6.5

16 to 60 inches; white & pale yellow very gravelly loamy coarse sand & gravel; single grain; loose; pH 5.6 to 6.7

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.7 inches)

Very Low (1.9 inches)

Water Retention Class

2 (1.3 inches)

3 (1.0 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.20

0.15

Soil Productivity

Very Low

Low

Soil Manageability

Group

II

III

Class

2p

3P

Annual Forage Production (lb/acre)

< 200

200 to 400

Forest Survey Site Class

5-6

5

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xerorthents, ashy, Vitrandic Xerorthents, Vitrandic Xerorthents, warm & Vitrandic Xeropsamments; Kiona family, 15 to 30 percent slopes, on hillsides adjacent to terraces; and basalt Rock outcrop. Included areas make up approximately 25 percent of the map unit area.

108 - Chesaw - Railcity families - Rock outcrop complex, 15 to 60 percent slopes

Elevation: 7,600 to 10,400 feet Annual Precipitation: 12 to 35 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Chesaw family

35 percent

Mountainsides

15 to 60 percent

Red Fir

Railcity family

20 percent

Mountainsides

15 to 60 percent

Jeffrey Pine

Rock outcrop, rhyolitic

15 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

1/2 to 0 inch; decomposing Bitterbrush & Sagebrush leaves & grass stems

0 to 13 inches; brown loamy fine sand & gravelly loamy coarse sand; weak granular structure; soft; pH 6.5

Subsoil

—

Substratum

13 to 60 inches; pale brown & light yellowish brown gravelly loamy coarse sand & very cobbly loamy sand; weak granular structure; soft; pH 7.0

1 to 0 inch; decomposing Jeffrey Pine needles & twigs, & Big Sagebrush leaves

0 to 14 inches; grayish brown & light grayish brown gravelly extremely stony coarse sand; weak granular structure; soft; pH 5.5 to 6.5

—

14 to 60 inches; light brownish gray & gray very cobbly & very stony coarse sand; massive; pH 6.5 to 7.0

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

—

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (2.0 inches)

Very Low (1.7 inches)

—

Water Retention Class

3 (1.0 inches)

3 (0.5 inches)

—

Hydrologic Soil Group

A

A

—

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Very Rapid (20+ in./hr.)

—

Drainage Class

Somewhat Excessively

Somewhat Excessively

—

Max Erosion Hazard

Low to High

Low to High

—

Erosion Factor (k)

0.10

0.05

—

Soil Productivity

Low to Moderate

Very Low

—

Soil Manageability

Group

III

III

—

Class

3Pgex

3Pgex

—

Annual Forage Production (lb/acre)

300 to 600

< 200

—

Forest Survey Site Class

NC

6-7

—

Included Areas & Remarks

Included in this map unit are small areas of the Haypress & Corbett families & Vitrandic Xero- psamments; Chesaw & Railcity families, on 60 to 80 percent slopes; a soil similar to the Ola family, but with lighter surface colors & high amounts of lime, 0 to 30 percent slopes, in valleys; a soil similar to the Chesaw family, but with less base saturation, 0 to 30 percent slopes, on moraines & glacial outwash fans; and a soil similar to the Railcity family, but with an 8 to 12 inch pumice overburden. Included areas make up approximately 30 percent of the map unit area.

110 - Biglake - Chesaw families - Rock outcrop complex, 15 to 60 percent slopes

Elevation: 7,400 to 8,800 feet

Annual Precipitation: 12 to 20 inches

Soil Map Unit Components	Biglake family	Chesaw family	Rock outcrop, rhyolitic
Approx Proportion	40 percent	20 percent	20 percent
Landscape Position	Mountainsides	Mountainsides	Mountainsides & Ridges
Slope	15 to 60 percent	15 to 60 percent	—
Typical Vegetation	Jeffrey Pine	Big Sagebrush	Barren

Soil Profile Description

Surface Layer	0 to 15 inches; grayish brown coarse sand; weak granular structure; soft; pH 7.0	1/2 to 0 inch; decomposing Bitterbrush & Sagebrush leaves & grass stems 0 to 13 inches; brown loamy fine sand & gravelly loamy coarse sand; weak granular structure; soft; pH 6.5	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants
Subsoil	—	—	—
Substratum	15 to 60 inches; brown & yellowish brown gravelly & extremely cobbly coarse sand; weak & moderate subangular blocky structure; soft; pH 7.0	13 to 60 inches; pale brown & light yellowish brown gravelly loamy coarse sand & very cobbly loamy sand; weak granular structure; soft; pH 7.0	—

Soil Properties

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (1.5 inches)	Low (2.0 inches)	—
Water Retention Class	3 (0.8 inches)	3 (1.0 inches)	—
Hydrologic Soil Group	A	A	—
Permeability (in./hr.)	Very Rapid (20+ in./hr.)	Mod. Rapid (6 to 20 in./hr.)	—
Drainage Class	Somewhat Excessively	Somewhat Excessively	—
Max Erosion Hazard	Low to High	Low to High	—
Erosion Factor (k)	0.10	0.10	—
Soil Productivity	Low	Low to Moderate	—
Soil Manageability Group	III	III	—
Class	3Pgex	3Pgex	—
Annual Forage Production (lb/acre)	200 to 600	300 to 600	—
Forest Survey Site Class	5-6	NC	—

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Biglake family, but with few rock fragments, and shallow to soft bedrock, on mountainsides, near rock outcroppings; and a soil similar to the Chesaw family, but with few rock fragments, and shallow to hard bedrock, on mountainsides, near rock outcroppings. Included areas make up approximately 20 percent of the map unit area.

**111 - Vitrandic Xeropsamments - Corbett family - Rock outcrop complex,
15 to 30 percent slopes**

Elevation: 7,800 to 9,600 feet

Annual Precipitation: 12 to 35 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

**Vitrandic
Xeropsamments**

25 percent

Mountainsides

15 to 30 percent

Red Fir

Corbett family

25 percent

Mountainsides

15 to 30 percent

Jeffrey Pine

**Rock outcrop,
rhyolitic**

15 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

2 to 0 inch; decomposing Fir & Jeffrey Pine needles & twigs

0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 5.6

0 to 3 inches; light brownish gray gravelly loamy sand; weak subangular blocky structure; soft; pH 6.0

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants

Subsoil

—

—

—

Substratum

7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9

3 to 52 inches; light gray & white gravelly loamy sand & extremely gravelly loamy sand; massive; soft; pH 6.5

—

52 inches; soft rhyolitic tuff

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

52 inches (FB)

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Deep (40 to 60 inches)

—

Available Water Capacity

Moderate (4.4 inches)

Low (2.4 inches)

—

Water Retention Class

2 (1.4 inches)

3 (1.1 inches)

—

Hydrologic Soil Group

A

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

Somewhat Excessively

—

Max Erosion Hazard

Low to Moderate

Low to Moderate

—

Erosion Factor (k)

0.15

0.17

—

Soil Productivity

Low

Very Low

—

Soil Manageability

Group

II

III

—

Class

2epx

3Pex

—

Annual Forage Production (lb/acre)

200 to 400

< 200

—

Forest Survey Site Class

4-6

5-7

—

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xeropsamments & the Corbett family, 30 to 60 percent slopes; a soil similar to the Corbett family, but shallow to hard bedrock; Vitrandic Xerorthents, ashy, 30 Xerorthents, warm; the Haypress 60 percent slopes; the Chesaw family, 30 to 60 percent slopes; and the Railcity family, 30 to 60 percent slopes. Included areas make up approximately 35 percent of the map unit area.

114 - Haypress family - Rock outcrop association, 30 to 60 percent slopes

Elevation: 7,500 to 8,900 feet

Annual Precipitation: 12 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Haypress family, warm

55 percent

Mountainsides

30 to 60 percent

Bitterbrush & Big Sagebrush

Rock outcrop, rhyolitic

15 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

1/4 to 0 inch; decomposing Jeffrey Pine & plant parts

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 22 inches; dark grayish brown & brown gravelly loamy coarse sand; moderate granular structure; soft; pH 6.1

Subsoil

—

—

Substratum

22 to 60 inches; brown gravelly & very gravelly loamy coarse sand; moderate granular structure; soft; pH 6.5

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (2.8 inches)

—

Water Retention Class

3 (1.1 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Moderate to High

—

Erosion Factor (k)

0.13

—

Soil Productivity

Low to Moderate

—

Soil Manageability

Group

IV

—

Class

4EPXg

—

Annual Forage Production (lb/acre)

300 to 500

—

Forest Survey Site Class

7

—

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Haypress family, but less than 20 inches to hard bedrock, on mountainsides, near rock outcroppings; a soil similar to the Haypress family, but less than 20 inches to soft bedrock, on mountainsides, near rock outcroppings; & the Fez & Nanamkin families. Included areas make up approximately 30 percent of the map unit area.

**115 - Vitrandic Haploxerolls - Vitrandic Xerorthents, ashy, warm complex,
15 to 30 percent slopes**

Elevation: 7,300 to 8,000 feet

Annual Precipitation: 12 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Haploxerolls, warm

40 percent

Mountainsides

15 to 30 percent

Jeffrey Pine

Vitrandic Xerorthents, ashy, warm

30 percent

Mountainsides

15 to 30 percent

Jeffrey Pine

Soil Profile Description

Surface Layer

1/4 to 0 inch; decomposing Big Sagebrush & Bitterbrush plant parts

1/8 to 0 inch; decomposing Jeffrey Pine needles & Bitterbrush plant parts

0 to 10 inches; grayish brown gravelly coarse sand & loamy coarse sand; single grain & massive; loose & soft; pH 6.5

0 to 16 inches; grayish brown loamy coarse sand, gravelly loamy sand & gravelly coarse loamy sand; weak granular structure; soft; pH 5.1 to 5.6

Subsoil

—

—

Substratum

10 to 60 inches; light brownish gray, pinkish gray & pale brown gravelly coarse sand & loamy coarse sand; massive; soft; pH 7.0

16 to 60 inches; white & pale yellow very gravelly loamy coarse sand & gravel; single grain; loose; pH 5.6 to 6.7

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.4 inches)

Very Low (1.9 inches)

Water Retention Class

3 (1.1 inches)

3 (1.0 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low

Low to Moderate

Erosion Factor (k)

0.10

0.15

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

III

III

Class

3P

3Pe

Annual Forage Production (lb/acre)

300 to 500

200 to 400

Forest Survey Site Class

NC

5-6

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Haploxerolls, pumiceous & Vitrandic Xerorthents, ashy, warm, 30 to 60 percent slopes, on steep mountainsides; Vitrandic Xeropsamments warm, in lower and concave positions on mountainsides; Vitrandic Xerorthents, ashy, on mountainside; and Rock outcrop, rhyolitic & Bishop tuff, on mountainsides. Included areas make up approximately 30 percent of the map unit area.

116 - Haypress family 0 to 15 percent slopes

Elevation: 7,500 to 7,800 feet

Annual Precipitation: 12 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Haypress family

80 percent

Low Hills & Basalt Flows

0 to 15 percent

Big Sagebrush

Soil Profile Description

Surface Layer

1/4 to 0 inch; decomposing Jeffrey Pine & plant parts

0 to 22 inches; dark grayish brown & brown gravelly loamy coarse sand; moderate granular structure; soft; pH 6.1

Subsoil

—

Substratum

22 to 60 inches; brown gravelly & very gravelly loamy coarse sand; moderate granular structure; soft; pH 6.5

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.8 inches)

Water Retention Class

3 (1.1 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low

Erosion Factor (k)

0.13

Soil Productivity

Low to Moderate

Soil Manageability

Group

III

Class

3P

Annual Forage Production (lb/acre)

300 to 500

Forest Survey Site Class

7

Included Areas & Remarks

Included in this map unit are small areas of the Chesaw & the Biglake families. Included areas make up approximately 20 percent of the map unit area.

117 - Rock outcrop - Rubbleland complex

Elevation: 4,000 to 13,000

Annual Precipitation: 4 to 30 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Rock outcrop

60 percent

Mountainsides, Hillsides, Moraines, Ridges & Crests

—

Barren

Rubbleland

20 percent

Mountainsides, Hillsides & Moraine Sideslopes

—

Barren

Soil Profile Description

Surface Layer

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Rubbleland consists of areas of detached rock fragments (colluvium) which have accumulated on mountainsides & moraine sideslopes as talus. These areas support little or no vegetation & are subject to landslides.

Subsoil

—

—

Substratum

—

—

Soil Properties

Restrictive Layer Depth

—

—

Effective Rooting Depth (inches)

—

—

Available Water Capacity

—

—

Water Retention Class

—

—

Hydrologic Soil Group

—

—

Permeability (in./hr.)

—

—

Drainage Class

—

—

Max Erosion Hazard

—

—

Erosion Factor (k)

—

—

Soil Productivity

—

—

Soil Manageability

Group

—

—

Class

—

—

Annual Forage Production (lb/acre)

—

—

Forest Survey Site Class

—

—

Included Areas & Remarks

Included in this map unit are small areas of various soils. These inclusions occur in different combinations & proportions, depending upon parent material, climate & elevation: The Abgese, Bearskin, Berent, Biglake, Brantel, Calpine, Charcol, Chesaw, Corbett, Cowood, Cozetica, Delaney, Fez, Garlet, Guiser, Haypress, Jaybee, Kiona, Labshaft, Nanamkin, Pass Canyon, Powment, Preston, Railcity, Salt Chuck, Stecum, Sumine Sur, Waterman & Wrango families; & Lithic Cryorthents, Torriorthentic Haploxerolls, Vitrandic Cryorthents, Vitrandic Cryopsamments, Vitrandic Haploxerolls, Vitrandic Torriorthents, gravelly, Vitrandic Xerorthents ashy, Vitrandic Xerorthents, Vitrandic Xerorthents pumiceous, Vitrandic Xerorthents pumiceous warm, Vitrandic Xerorthents, warm Vitrandic Xeropsamments, Vitrandic Xeropsamments, warm, and Xeric Torriorthents, shallow. Included areas make up approximately 20 percent of the map unit area.

121 - Vitrandic Haploxerolls - Vitrandic Xeropsamments, warm complex, 15 to 30 percent slopes

Elevation: 7,600 to 8,000 feet

Annual Precipitation: 12 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Haploxerolls, warm

50 percent

Hillsides & Low Mountainsides

15 to 30 percent

Perennial Grass

Vitrandic Xeropsamments, warm

30 percent

Hillsides & Low Mountainsides

15 to 30 percent

Jeffrey Pine

Soil Profile Description

Surface Layer

1/4 to 0 inch; decomposing Big Sagebrush & Bitterbrush plant parts

0 to 1 inch; grayish brown loamy fine sand; massive; soft; pH 6.0

0 to 10 inches; grayish brown gravelly coarse sand & loamy coarse sand; single grain & massive; loose & soft; pH 6.5

Subsoil

—

—

Substratum

10 to 60 inches; light brownish gray, pinkish gray & pale brown gravelly coarse sand & loamy coarse sand; massive; soft; pH 7.0

1 to 60 inches; light brownish gray & light gray very gravelly & gravelly coarse sand; massive; soft; pH 6.5

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.4 inches)

Low (3.7 inches)

Water Retention Class

3 (1.1 inches)

2 (1.3 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low

Moderate

Erosion Factor (k)

0.10

0.20

Soil Productivity

Low to Moderate

Very Low

Soil Manageability

Group

III

II

Class

3P

2epx

Annual Forage Production (lb/acre)

300 to 500

< 200

Forest Survey Site Class

NC

6

Included Areas & Remarks

Included in this map unit are small areas of the Fez family, on mountainsides; and Rock outcrop, on mountainsides & ridges. Included areas make up approximately 20 percent of the map unit area.

**122 - Vitrandic Xerorthents, ashy - Vitrandic Xeropsamments - Vitrandic Cryorthents, ashy complex,
0 to 15 percent slopes**

Elevation: 6,800 to 8,600 feet

Annual Precipitation: 10 to 35 inches

Soil Map Unit Components	Vitrandic Xerorthents, ashy	Vitrandic Xeropsamments	Vitrandic Cryorthents, ashy
Approx Proportion	30 percent	20 percent	15 percent
Landscape Position	Mountainsides, Mountain Benches & Hillsides	Mountain Flats, Mountainsides, Hillsides & Glacial Outwash	Mountain Flats & Open Areas
Slope	0 to 15 percent	0 to 15 percent	0 to 15 percent
Typical Vegetation	Jeffrey Pine	Jeffrey Pine	Lodgepole Pine

Soil Profile Description

Surface Layer	1 to 0 inch; decomposing Jeffrey Pine & Red Fir needles, twigs & chips	2 to 0 inch; decomposing Fir & Jeffrey Pine needles & twigs	0 to 7 inches; grayish brown & pale brown gravelly sand; massive soft; pH 6.0
	0 to 4 inches; brown gravelly loamy sand; massive; soft; pH 6.0	0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 5.6	
Subsoil	4 to 23 inches; pale brown gravelly loamy sand & loamy sand; massive; soft; pH 5.6 to 5.9	—	—
Substratum	23 to 60 inches; pale brown & pinkish gray very gravelly loamy sand & loamy sand; massive; soft; pH 5.1 to 5.9	7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9	7 to 60 inches; light gray & white fine sand, sand, gravelly & extremely gravelly coarse sand massive; soft; pH 6.0 to 7.0

Soil Properties

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	Greater than 60 inches
Effective Rooting Depth	Deep (40 to 60 inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)
Available Water Capacity	Moderate (5.5 inches)	Moderate (4.4 inches)	Low (3.4 inches)
Water Retention Class	2 (1.7 inches)	2 (1.4 inches)	2 (1.5 inches)
Hydrologic Soil Group	A	A	A
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)
Drainage Class	Somewhat Excessively	Somewhat Excessively	Somewhat Excessively
Max Erosion Hazard	Low	Low	Low
Erosion Factor (k)	0.10	0.15	0.15
Soil Productivity	Low	Low	Low
Soil Manageability Group	II	II	II
Class	2p	2p	2p
Annual Forage Production	200 to 400 lb/acre	200 to 400 lb/acre	200 to 400 lb/acre
Forest Survey Site Class	5	5	5-7

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xerorthents, ashy, warm, on mountainsides & hillsides; Vitrandic Cryopsamments, on mountainsides, sand flats, depressions & opening in wooded areas; the Cozetica family, on mountainsides & hillsides; a soil similar to the Stecum family, but with a loamy-skeletal texture, on moraine sideslopes; the Fez family, 0 to 30 percent slopes, on mountainsides; Vitrandic Xerorthents, ashy, on hillsides, mountainsides & mountain benches; and Rock outcrop, on mountainsides & ridges. Included areas make up approximately 35 percent of the map unit area.

124 - Vitrandic Xerorthents, pumiceous, warm - Vitrandic Haploxerolls, pumiceous - Vitrandic Xerorthents, ashy, warm complex, 0 to 15 persen

Elevation: 7,700 to 8,100 feet

Annual Precipitation: 12 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

**Vitrandic Xerorthents,
pumiceous, warm**

40 percent

Mountainsides & Rolling Hillsides

0 to 15 percent

Jeffrey Pine

**Vitrandic
Haploxerolls,
pumiceous**

20 percent

Rolling Hillsides & Undulating
Mountain Flats

0 to 15 percent

Jeffrey Pine

**Vitrandic Xerorthents,
ashy, warm**

15 percent

Mountainsides & Hillsides

0 to 15 percent

Jeffrey Pine

Soil Profile Description

Surface Layer

4 to 0 inch; decomposed &
decomposing Jeffrey Pine needles,
twigs & cones

0 to 8 inches; grayish brown & light
brownish gray very gravelly coarse
sand; weak granular structure &
massive; soft; pH 6.0 to 6.5

0 to 3 inches; grayish brown
loamy sand; massive; soft; pH
5.5

3 to 60 inches; brown &
yellowish brown very gravelly &
cobbly loamy sand; massive;
soft; pH 6.0

1/8 to 0 inch; decomposing Jeffrey
Pine needles & Bitterbrush plant
parts

0 to 16 inches; grayish brown
loamy coarse sand, gravelly loamy
sand & gravelly loamy coarse
sand; weak granular structure; soft;
pH 5.1 to 5.6

16 to 60 inches; white & pale
yellow very gravelly loamy coarse
sand & gravel; single grain; loose;
pH 5.6 to 6.7

Subsoil

Substratum

—

—

—

Soil Properties

Restrictive Layer Depth

Effective Rooting Depth
(inches)

Available Water Capacity

Water Retention Class

Hydrologic Soil Group

Permeability (in./hr.)

Drainage Class

Max Erosion Hazard

Erosion Factor (k)

Soil Productivity

Soil Manageability

Group

Class

Annual Forage Production
(lb/acre)

Forest Survey Site Class

Greater than 60 inches

Very Deep (> 60 inches)

Low (3.1 inches)

3 (0.6 inches)

A

Rapid (6 to 20 in./hr.)

Somewhat Excessively

Low

0.10

Low

III

3P

200 to 400

5

Greater than 60 inches

Very Deep (> 60 inches)

Moderate (4.3 inches)

2 (1.3 inches)

A

Rapid (6 to 20 in./hr.)

Somewhat Excessively

Low

0.15

Low to Moderate

II

2p

300 to 600

5

Greater than 60 inches

Very Deep (> 60 inches)

Very Low (1.9 inches)

3 (1.0 inches)

A

Rapid (6 to 20 in./hr.)

Somewhat Excessively

Low

0.15

Low

III

3P

200 to 400

5

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Cryopsamments, in mountain basins & mountain flats; Vitrandic Cryorthents, pumiceous, on rolling hills & mountainsides; Vitrandic Haploxerolls, on rolling hills & mountainsides; Vitrandic Xeropsamments, warm, on rolling hills & mountainsides; and Vitrandic Xeropsamments, on mountainsides, at higher elevations. Included areas make up approximately 25 percent of the map unit area.

126 - Vitrandic Cryorthents, pumiceous - Vitrandic Cryorthents - Vitrandic Xerorthents, pumiceous complex, 0 to 15 percent slopes

Elevation: 8,000 to 8,400 feet Annual Precipitation: 15 to 30 inches

Soil Map Unit Components	Vitrandic Cryorthents, pumiceous	Vitrandic Cryorthents	Vitrandic Xerorthents, pumiceous
Approx Proportion	25 percent	25 percent	15 percent
Landscape Position	Hillsides & Terraces	Hillsides, Terraces & Mountain Flats	Hillsides & Terraces
Slope	0 to 15 percent	0 to 15 percent	0 to 15 percent
Typical Vegetation	Lodgepole Pine	Lodgepole Pine	Jeffrey Pine

Soil Profile Description

Surface Layer	1/2 to 0 inch; decomposing & decomposed Lodgepole Pine needles, twigs & cones	1 to 0 inch; decomposed & decomposing Lodgepole Pine needles, twigs & cones	3 to 0 inch; decomposing Jeffrey & Lodgepole Pine needles, twigs & cones
Subsoil	—	—	—
Substratum	0 to 18 inches; light brownish gray & pale brown very gravelly sand; weak granular structure; soft; pH 5.0 to 5.5	0 to 2 inches; grayish brown very gravelly coarse sand; massive; soft; pH 5.5	0 to 10 inches; very pale brown, white, gray & light brownish gray gravelly loamy coarse sand, extremely massive; soft; pH 5.3
	18 to 60 inches; light gray, dark gray, light brownish gray & pale brown gravelly sand, fine sand & loamy fine sand; massive; soft; pH 6.0 to 6.5	2 to 60 inches; pale brown, light brownish gray, dark gray & pinkish gray very gravelly coarse sand; massive; soft; pH 5.5 to 6.5	10 to 60 inches; very pale brown, white, gray & light brownish gray gravelly loamy coarse sand, extremely gravelly coarse sand & loamy sand; weak platy structure &

Soil Properties

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	Greater than 60 inches
Effective Rooting Depth	Very Deep (> 60 inches)	Mod. Deep (20 to 40 inches)	Mod. Deep (20 to 40 inches)
Available Water Capacity	Moderate (5.4 inches)	Very Low (1.6 inches)	Low (3.6 inches)
Water Retention Class	2 (1.2 inches)	3 (0.9 inches)	3 (1.1 inches)
Hydrologic Soil Group	A	A	A
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Very Rapid (20+ in./hr.)	Rapid (6 to 20 in./hr.)
Drainage Class	Somewhat Excessively	Somewhat Excessively	Somewhat Excessively
Max Erosion Hazard	Low	Low	Low
Erosion Factor (k)	0.10	0.10	0.15
Soil Productivity	Low	Very Low	Low
Soil Manageability Group	II	III	III
Class	2p	3Px	3Px
Annual Forage Production	200 to 400 lb/acre	< 200 lb/acre	200 to 400 lb/acre
Forest Survey Site Class	5-7	5-7	5-7

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to Vitrandic Cryorthents, pumiceous, but the lower part of the soil is mixed mineralogy, on terraces; Vitrandic Xerorthents, warm, on mountain flats & fringes of mountain flats dominated by Jeffrey Pine; Vitrandic Xerorthents, ashy, 1 to 5 percent slopes, on mountain flats; Vitrandic Xeropsammments, 1 to 5 percent slopes, on mountain flats; and Rock outcrop, on mountainsides & ridges. Included areas make up approximately 35 percent of the map unit area.

**127 - Vitrandic Cryorthents, pumiceous - Vitrandic Cryorthents complex,
15 to 30 percent slopes**

Elevation: 8,400 to 9,000 feet

Annual Precipitation: 15 to 30 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

**Vitrandic Cryorthents,
pumiceous**

50 percent

Hillsides

15 to 30 percent

Lodgepole Pine

Vitrandic Cryorthents

25 percent

Hillsides

15 to 30 percent

Lodgepole Pine

Soil Profile Description

Surface Layer

1/2 to 0 inch; decomposing & decomposed
Lodgepole Pine needles, twigs & cones

1 to 0 inch; decomposed & decomposing Lodgepole
Pine needles, twigs & cones

0 to 18 inches; light brownish gray & pale brown
very gravelly sand; weak granular structure; soft;
pH 5.0 to 5.5

0 to 2 inches; grayish brown very gravelly coarse
sand; massive; soft; pH 5.5

Subsoil

—

—

Substratum

18 to 60 inches; light gray, dark gray, light
brownish gray & pale brown gravelly sand, fine
sand & loamy fine sand; massive; soft; pH 6.0 to
6.5

2 to 60 inches; pale brown, light brownish gray, dark
gray & pinkish gray very gravelly coarse sand;
massive; soft; pH 5.5 to 6.5

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth
(inches)

Very Deep (> 60 inches)

Mod. Deep (20 to 40 inches)

Available Water Capacity

Moderate (5.4 inches)

Very Low (1.6 inches)

Water Retention Class

2 (1.2 inches)

3 (0.9 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Very Rapid (20+ in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.10

0.10

Soil Productivity

Low

Very Low

Soil Manageability

Group

II

III

Class

2ep

3Pex

Annual Forage Production
(lb/acre)

200 to 400

< 200

Forest Survey Site Class

5-7

5-7

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xerorthents, pumiceous, on hillsides dominated by Jeffrey Pine; Vitrandic Xerorthents, pumiceous, cold, on hillsides with Jeffrey Pine & Lodgepole Pine vegetation; Vitrandic Cryopsamments, on hillsides; and Rock outcrop, on hillsides & ridges. Included areas make up approximately 25 percent of the map unit area.

**131 - Corbett family - Vitrandic Xeropsamments, warm - Rock outcrop complex,
15 to 30 percent slopes**

Elevation: 7,200 to 8,600 feet

Annual Precipitation: 10 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Corbett family

40 percent

Mountainsides

15 to 30 percent

Jeffrey Pine

**Vitrandic
Xeropsamments,
warm**

20 percent

Mountainsides

15 to 30 percent

Jeffrey Pine

**Rock outcrop,
rhyolitic**

20 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 3 inches; light brownish gray
gravelly loamy sand; weak
subangular blocky structure; soft;
pH 6.0

0 to 1 inch; grayish brown loamy
fine sand; massive; soft; pH 6.0

Rock outcrop consists of
continuous bare bedrock & less
than 15 percent inclusions of soil
material capable of supporting
plants.

Subsoil

—

—

—

Substratum

3 to 52 inches; light gray & white
gravelly loamy sand & extremely
gravelly loamy sand; massive; soft;
pH 6.5

1 to 60 inches; light brownish
gray & light gray very gravelly &
gravelly coarse sand; massive;
soft; pH 6.5

—

52 inches; soft rhyolitic tuff

Soil Properties

Restrictive Layer Depth

52 inches (FB)

Greater than 60 inches

Effective Rooting Depth
(inches)

Deep (40 to 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.4 inches)

Low (3.7 inches)

Water Retention Class

3 (1.1 inches)

2 (1.3 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.17

0.20

Soil Productivity

Very Low

Very Low

Soil Manageability

Group

III

II

Class

3Pex

2epx

Annual Forage Production
(lb/acre)

< 200

< 200

Forest Survey Site Class

5-6

6

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xeropsamments, on mountainsides; and the Railcity family, on mountainsides, near rock outcroppings. Included areas make up approximately 20 percent of the map unit area.

132 - Corbett - Railcity families - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 7,200 to 9,600 feet

Annual Precipitation: 10 to 25 inches

Soil Map Unit Components	Corbett family	Railcity family	Rock outcrop, rhyolitic
Approx Proportion	35 percent	20 percent	15 percent
Landscape Position	Mountainsides	Mountainsides	Mountainsides & Ridges
Slope	30 to 60 percent	30 to 60 percent	—
Typical Vegetation	Jeffrey Pine	Jeffrey Pine	Barren

Soil Profile Description

Surface Layer	0 to 3 inches; light brownish gray gravelly loamy sand; weak subangular blocky structure; soft; pH 6.0	1 to 0 inch; decomposing Jeffrey Pine needles & twigs, and Big Sagebrush leaves 0 to 14 inches; grayish brown & light grayish brown gravelly & extremely stony coarse sand; weak granular structure; soft; pH 5.5 to 6.5	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	—	—
Substratum	3 to 52 inches; light gray & white gravelly loamy sand & extremely gravelly loamy sand; massive; soft; pH 6.5 52 inches; soft rhyolitic tuff	14 to 60 inches; light brownish gray & gray very cobbly & very stony coarse sand; massive; pH 6.5 to 7.0	—

Soil Properties

Restrictive Layer Depth	52 inches (FB)	Greater than 60 inches	—
Effective Rooting Depth (inches)	Deep (40 to 60 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Low (2.4 inches)	Very Low (1.7 inches)	—
Water Retention Class	3 (1.1 inches)	3 (0.5 inches)	—
Hydrologic Soil Group	A	A	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Very Rapid (20+ in./hr.)	—
Drainage Class	Somewhat Excessively	Somewhat Excessively	—
Max Erosion Hazard	Moderate to High	Moderate to High	—
Erosion Factor (k)	0.17	0.05	—
Soil Productivity	Very Low	Very Low	—
Soil Manageability			
Group	IV	IV	—
Class	4EPXg	4EPXg	—
Annual Forage Production (lb/acre)	< 200	< 200	—
Forest Survey Site Class	5-7	6-7	—

Included Areas & Remarks

Included in this map unit are small areas of the Corbett, Railcity & Basket families, 15 to 30 percent slopes, on lower mountainsides; Vitrandic Xeropsammets, ashy, on mountainsides; a soil similar to the Corbett family, but with high amounts of rock fragments below 40 inches, 15 to 30 percent slopes, on lower mountainsides; and a soil similar to the Credo family, but with less than 18 percent clay in the textural control section. Included areas make up approximately 30 percent of the map unit area.

133 - Corbett family - Rock outcrop - Railcity family complex, 15 to 30 percent slopes

Elevation: 7,400 to 8,400 feet

Annual Precipitation: 10 to 20 inches

Soil Map Unit Components

	Corbett family	Rock outcrop, rhyolitic	Railcity family
Approx Proportion	40 percent	20 percent	15 percent
Landscape Position	Mountainsides	Mountainsides & Ridges	Mountainsides, near Rock outcroppings
Slope	15 to 30 percent	—	15 to 30 percent slopes
Typical Vegetation	Jeffrey Pine	Barren	Jeffrey Pine

Soil Profile Description

Surface Layer	0 to 3 inches; light brownish gray gravelly loamy sand; weak subangular blocky structure; soft; pH 6.0	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.	1 to 0 inch; decomposing Jeffrey Pine needles & twigs, and Big Sagebrush leaves 0 to 14 inches; grayish brown gravelly & extremely stony
Subsoil	—	—	—
Substratum	3 to 52 inches; light gray & white gravelly loamy sand & extremely gravelly loamy sand; massive; soft; pH 6.5 52 inches; soft rhyolitic tuff	—	14 to 60 inches; light brownish gray & gray very cobbly & very stony coarse sand; massive; pH 6.5 to 7.0

Soil Properties

Restrictive Layer Depth	52 inches (FB)	—	Greater than 60 inches
Effective Rooting Depth (inches)	Deep (40 to 60 inches)	—	Very Deep (> 60 inches)
Available Water Capacity	Low (2.4 inches)	—	Very Low (1.7 inches)
Water Retention Class	3 (1.1 inches)	—	3 (0.5 inch)
Hydrologic Soil Group	A	—	A
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	—	Very Rapid (20+ in./hr.)
Drainage Class	Somewhat Excessively	—	Somewhat Excessively
Max Erosion Hazard	Moderate	—	Low to Moderate
Erosion Factor (k)	0.17	—	0.05
Soil Productivity	Low	—	
Soil Manageability			
Group	IV	—	IV
Class	4PXe	—	4PXe
Annual Forage Production (lb/acre)	< 200	—	< 200
Forest Survey Site Class	5	—	6-7

Included Areas & Remarks

Included in this map unit are small areas of the Corbett & Railcity families, 0 to 15 percent slopes, on gentle mountainsides; the Haypress family, on mountainsides; a soil similar to the Corbett family, but with higher amounts of rock fragments in the lower 30 inches of the profile, 0 to 15 percent slopes, on gentler mountainsides; a soil similar to Xeric Torriorthents, shallow, but with hard bedrock, the Stecum family, but with few approximately 25 percent of the

134 - Vitrandic Xeropsamments, warm, 0 to 15 percent slopes

Elevation: 6,500 to 8,100 feet

Annual Precipitation: 8 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Xeropsamments, warm

80 percent

Valley Bottoms, Mountain Stringer Valleys & Mountain Toeslopes

0 to 15 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 1 inch; grayish brown loamy fine sand; massive; soft; pH 6.0

Subsoil

—

Substratum

1 to 60 inches; light brownish gray & light gray very gravelly & gravelly coarse sand; massive; soft; pH 6.5

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.7 inches)

Water Retention Class

2 (1.3 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low

Erosion Factor (k)

0.20

Soil Productivity

Very Low

Soil Manageability Group

II

Annual Forage Production (lb/acre)

< 200

Forest Survey Site Class

6

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to Vitrandic Xeropsamments, warm, but 40 to 60 inches to hard bedrock, on hillsides; the Lakash family, in drier valley bottoms; & Vitrandic Haploxerolls, on foothills. Included areas make up approximately 20 percent of the map unit area.

136 - Vitrandic Cryopsamments, 0 to 15 percent slopes

Elevation: 7,500 to 8,200 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Cryopsamments

90 percent

Mountain Basins

0 to 15 percent

Perennial Grass

Soil Profile Description

Surface Layer

0 to 11 inches; grayish brown & light brown gray loamy sand & gravelly coarse sand; massive; soft; pH 5.5 to 7.0

Subsoil

—

Substratum

11 to 60 inches; light gray, light brownish gray, light brown & pale brown gravelly coarse sand, loamy coarse sand & sand; massive; soft & slightly hard; pH 6.5 to 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.1 inches)

Water Retention Class

3 (1.2 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low

Erosion Factor (k)

0.20

Soil Productivity

Low to Moderate

Soil Manageability

Group

III

Class

3P

Annual Forage Production (lb/acre)

200 to 500

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Cryorthents. Included areas make up approximately 10 percent of the map unit area.

**137 - Vitrandic Xerorthents, pumiceous, warm - Vitrandic Xerorthents complex,
0 to 30 percent slopes**

Elevation: 7,600 to 8,600 feet

Annual Precipitation: 10 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

**Vitrandic Xerorthents,
pumiceous, warm**

40 percent

Mountainsides

0 to 30 percent

Jeffrey Pine

Vitrandic Xerorthents

25 percent

Mountainsides

0 to 30 percent

Jeffrey Pine

Soil Profile Description

Surface Layer

4 to 0 inch; decomposed & decomposing Jeffrey Pine needles, twigs & cones

1 to 0 inch; decomposing Red Fir & Jeffrey Pine needles, twigs & small branches

0 to 8 inches; grayish brown & light brownish gray very gravelly coarse sand; weak granular structure & massive; soft; pH 6.0 to 6.5

0 to 4 inches; brown & pinkish gray extremely gravelly loamy sand; massive; soft; pH 5.5

Subsoil

—

—

Substratum

8 to 60 inches; light gray, very dark gray & white extremely gravelly & gravelly coarse sand; single grain & massive; loose & soft; pH 7.0

4 to 60 inches; very pale brown & brown extremely gravelly coarse sand; single grain; loose; pH 5.0 to 6.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.1 inches)

Very Low (0.8 inches)

Water Retention Class

3 (0.6 inches)

3 (0.3 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.10

0.10

Soil Productivity

Low

Very Low

Soil Manageability

Group

III

III

Class

3P

3P

Annual Forage Production (lb/acre)

200 to 400

< 200

Forest Survey Site Class

5-7

5-7

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Cryopsamments, 0 to 15 percent slopes, on mountain flats; Typic Xeropsamments, Typic Xeropsamments, warm, the Fez family, Vitrandic Haploxerolls, pumiceous, Vitrandic Xerorthents, pumiceous, & rhyolitic Rock outcrops. Included areas make up approximately 35 percent of the map unit area.

**138 - Vitrandic Xerorthents, pumiceous - Vitrandic Xeropsamments - Rock outcrop complex,
30 to 60 percent slopes**

Elevation: 7,600 to 8,600 feet

Annual Precipitation: 10 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

**Vitrandic Xerorthents,
pumiceous**

35 percent

Mountainsides

30 to 60 percent

Mixed Conifer

**Vitrandic
Xeropsamments**

20 percent

Mountainsides

30 to 60 percent

Mixed Conifer

**Rock outcrop,
rhyolitic**

15 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

3 to 0 inch; decomposing Jeffrey Pine & Lodgepole Pine needles, twigs & cones

0 to 10 inches; grayish brown & light brownish gray loamy coarse sand & gravelly loamy sand; weak platy structure & massive; soft; pH 5.0

2 to 0 inch; decomposing Fir & Jeffrey Pine needles & twigs

0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 4.9

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

—

Substratum

10 to 60 inches; very pale brown, white, gray & light brownish gray gravelly loamy coarse sand, extremely gravelly coarse sand & loamy sand; weak platy structure, massive & single grain; soft; pH 5.3

7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

—

Effective Rooting Depth (inches)

Mod. Deep (20 to 40 inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (3.6 inches)

Moderate (4.4 inches)

—

Water Retention Class

3 (1.1 inches)

2 (1.4 inches)

—

Hydrologic Soil Group

A

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

Somewhat Excessively

—

Max Erosion Hazard

Moderate to High

Moderate to High

—

Erosion Factor (k)

0.15

0.15

—

Soil Productivity

Low

Low

—

Soil Manageability

Group

IV

IV

—

Class

4EPXg

4EXpg

—

Annual Forage Production (lb/acre)

200 to 400

200 to 400

—

Forest Survey Site Class

5-7

4-5

—

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xeropsamments, warm & Vitrandic Haploxerolls, 15 to 30 percent slopes, on gentler mountainsides & toeslopes; Vitrandic Xerorthents, pumiceous, warm; the Fez family; Vitrandic Cryopsamments; & a soil similar to Vitrandic Xeropsamments, warm, but with loamy texture in the lower half of the soil profile & on drier, 15 to 30 percent slopes. Included areas make up approximate 30 percent of the map unit area.

139 - Brantel family, 0 to 15 percent slopes

Elevation: 6,400 to 8,400 feet

Annual Precipitation: 6 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Brantel family

70 percent

Fans, Low Hills & Sand Flats

0 to 15 percent

Bitterbrush

Soil Profile Description

Surface Layer

0 to 9 inches; light brownish gray & light gray coarse sand & gravelly loamy coarse sand; massive; soft; pH 5.0

Subsoil

—

Substratum

9 to 60 inches; white, light gray, dark gray & black gravelly coarse sand & loamy coarse sand & gravel; massive, single grain & platy structure; soft; pH 5.5 to 7.2

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.4 inches)

Water Retention Class

3 (0.9 inches)

Hydrologic Soil Group

B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low

Erosion Factor (k)

0.10

Soil Productivity

Low

Soil Manageability

Annual Forage Production (lb/acre)

200 to 400

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Brantel family, but with stratified lacustrine deposits at a 30 to 40 inch depth, and calcareous; Vitrandic Haploxerolls, on bench terraces; a soil similar to Vitrandic Xerorthents, warm, but drier, on terraces; the Lakash family, on terraces; & the Deepwell family. Included areas make up approximately 30 percent of the map unit area.

140 - Cozetica family - Rock outcrop association, 15 to 60 percent slopes

Elevation: 7,200 to 9,200 feet

Annual Precipitation: 10 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Cozetica family

50 percent

Mountainsides & Moraines

15 to 60 percent

Big Sagebrush

Rock outcrop

20 percent

Mountainsides, Sideslopes of Moraines & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 6 inches; grayish brown & light brownish gray
gravelly sand; single grain; loose; pH 5.5 to 6.2

Rock outcrop consists of continuous bare bedrock &
less than 15 percent inclusions of soil material capable
of supporting plants.

Subsoil

—

—

Substratum

6 to 60 inches; light gray & very pale brown loamy
sand & gravelly coarse sand; single grain; loose;
pH 5.4 to 6.1

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth
(inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Moderate (4.1 inches)

—

Water Retention Class

2 (1.6 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low to High

—

Erosion Factor (k)

0.08

—

Soil Productivity

Low

—

Soil Manageability

Annual Forage Production
(lb/acre)

200 to 400

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Cozetica family, 0 to 15 percent slopes; a soil similar to the Cozetica family, but shallow to hard bedrock, on mountainsides & moraines, near rock outcroppings; a soil similar to the Berent family, but colder, on mountainsides; and Aquic Haploxerolls, 0 to 15 percent slopes, in concave areas & basins. Included areas make up approximately 30 percent of the map unit area.

142 - Brantel family - Rock outcrop complex, 0 to 30 percent slopes

Elevation: 7,000 to 7,600 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components

Approx Proportion

Brantel family

50 percent

Landscape Position

Hillsides, Hilltops & Depressions

Slope

0 to 30 percent

Typical Vegetation

Bitterbrush

Rock outcrop, tuffaceous & granitic

20 percent

Hillsides & Hilltops

—

Barren

Soil Profile Description

Surface Layer

0 to 9 inches; light brownish gray & light gray coarse sand & gravelly loamy coarse sand; massive; soft; pH 5.0

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

9 to 60 inches; white, light gray, dark gray & black gravelly coarse sand & loamy coarse sand & gravel; massive, single grain & platy structure; soft; pH 5.5 to 7.2

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Deep (40 to 60 inches)

—

Available Water Capacity

Low (2.4 inches)

—

Water Retention Class

3 (0.9 inches)

—

Hydrologic Soil Group

B

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat excessively

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.10

—

Soil Productivity

Low

—

Soil Manageability

Group

IV

—

Class

4PXe

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Brantel family, but shallow to fractured tuff, on hillsides; a soil similar to the Berent family, but shallow to hard bedrock, near rock outcroppings; & a soil similar to the Berent family, but with ash parent material in the upper half of the soil profile, near rock outcroppings. Included areas make up approximately 30 percent of the map unit area.

**143 - Vitrandic Xerorthents, pumiceous - Vitrandic Xeropsamments complex,
0 to 15 percent slopes**

Elevation: 7,500 to 8,600 feet

Annual Precipitation: 10 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

**Vitrandic Xerorthents,
pumiceous**

60 percent

Mountain Basins

0 to 15 percent

Perennial Grass

Vitrandic Xeropsamments

25 percent

Mountain Basins

0 to 15 percent

Perennial Grass

Soil Profile Description

Surface Layer

3 to 0 inch; decomposing Jeffrey & Lodgepole
Pine needles, twigs & cones

2 to 0 inch; decomposing Red Fir & Jeffrey Pine
needles & twigs

0 to 10 inches; grayish brown & light brownish
gray loamy coarse sand & gravelly loamy sand;
weak platy structure & massive; soft; pH 5.0

0 to 7 inches; pale brown loamy coarse sand; weak
granular structure; soft; pH 5.6

Subsoil

—

—

Substratum

10 to 60 inches; very pale brown, white, gray &
light brownish gray gravelly loamy coarse sand,
extremely gravelly coarse sand & loamy sand;
weak platy structure, single grain & massive; soft;
pH 5.3

7 to 60 inches; very pale brown & light gray loamy
sand; weak granular structure; soft; pH 4.9

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth
(inches)

Mod. Deep (20 to 40 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.6 inches)

Moderate (4.4 inches)

Water Retention Class

3 (1.1 inches)

2 (1.4 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.15

0.15

Soil Productivity

Low

Low

Soil Manageability

Group

III

II

Class

3P

2p

Annual Forage Production
(lb/acre)

200 to 400

200 to 400

Forest Survey Site Class

5-7

4-5

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xerorthents & Vitrandic Xerorthents, ashy, on fringes of mountain basins. Included areas make up approximately 15 percent of the map unit area.

144 - Cozetica family, 0 to 30 percent slopes

Elevation: 7,500 to 8,000 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Cozetica family

75 percent

Mountain Toeslopes, Mountain Flats & Basins

0 to 30 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 6 inches; grayish brown & light brownish gray
gravelly sand; single grain; loose; pH 5.5 to 6.2

Subsoil

—

Substratum

6 to 60 inches; light gray & very pale brown loamy
sand & gravelly coarse sand; single grain; loose;
pH 5.4 to 6.1

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth
(inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (4.1 inches)

Water Retention Class

2 (1.6 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Erosion Factor (k)

0.08

Soil Productivity

Low

Soil Manageability

Group

II

Class

2ep

Annual Forage Production
(lb/acre)

200 to 400

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Lakash family, on edges of mountain flats & on lower mountainsides; Vitrandic Xerorthents, ashy, warm, on mountain toeslopes, flats & basins; Vitrandic Xeropsamments, warm, on mountain toeslopes, flats & basins; and Vitrandic Xerorthents, on mountain toeslopes, flats & basins. Included areas make up approximately 25 percent of the map unit area.

145 - Vitrandic Xeropsamments, warm - Vitrandic Xerorthents, ashy, warm - Vitrandic Cryorthents, ashy complex, 0 to 30 percent slopes

Elevation: 7,500 to 8,000 feet

Annual Precipitation: 10 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

**Vitrandic
Xeropsamments,
warm**

40 percent

Mountainsides & Hillsides

0 to 30 percent

Jeffrey Pine

**Vitrandic
Xerorthents, ashy,
warm**

30 percent

Mountainsides & Hillsides

0 to 30 percent

Jeffrey Pine

**Vitrandic Cryorthents,
ashy**

15 percent

Mountain Flats & Open Areas

0 to 15 percent

Jeffrey Pine/Lodgepole Pine

Soil Profile Description

Surface Layer

0 to 1 inch; grayish brown loamy fine sand; massive; soft; pH 6.0

1/8 to 0 inch; decomposing Jeffrey Pine needles & Bitterbrush plant parts

0 to 7 inches; grayish brown & pale brown gravelly sand; massive; soft; pH 6.0

0 to 16 inches; grayish brown loamy coarse sand & gravelly loamy sand; weak granular structure; soft; pH 5.1 to 5.6

Subsoil

—

—

—

Substratum

1 to 60 inches; light brownish gray & light gray very gravelly & gravelly coarse sand; massive; soft; pH 6.5

16 to 60 inches; white & pale brown very gravelly loamy coarse sand & gravel; single grain; loose; pH 5.6 to 6.7

7 to 60 inches; light gray & white fine sand, sand, gravelly & extremely gravelly coarse sand massive; soft; pH 6.0 to 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.7 inches)

Very Low (1.9 inches)

Low (3.4 inches)

Water Retention Class

2 (1.3 inches)

3 (1.0 inches)

2 (1.5 inches)

Hydrologic Soil Group

A

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low to Moderate

Low

Erosion Factor (k)

0.20

0.15

0.15

Soil Productivity

Very Low

Low

Low

Soil Manageability

Group

II

III

II

Class

2epx

3Pex

2px

Annual Forage Production (lb/acre)

< 200

200 to 400

200 to 400

Forest Survey Site Class

5-6

5-6

5-7

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xeropsamments, 0 to 30 percent slopes, in mountain basins & flats; and Rock outcrop. Included areas make up approximately 15 percent of the map unit area.

146 - Lakash - Brantel families complex, 0 to 15 percent slopes

Elevation: 6,500 to 7,300 feet

Annual Precipitation: 6 to 12 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Lakash family

40 percent

Hillsides & Terraces

0 to 15 percent

Big Sagebrush

Brantel family

30 percent

Hillsides & Terraces

0 to 15 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 5 inches; light brownish gray & pale brown gravelly coarse sand; massive & single grain; loose & soft; pH 5.3

0 to 9 inches; light brownish gray & light gray coarse sand & gravelly loamy coarse sand; massive; soft; pH 5.0

Subsoil

—

—

Substratum

5 to 60 inches; light gray & white gravelly loamy sand & coarse sand; massive; soft; pH 5.7 to 8.7

9 to 60 inches; white, light gray, dark gray & black gravelly coarse sand & loamy coarse sand & gravel; massive; single grain & platy structure; soft; pH 5.5 to 7.2

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Deep (40 to 60 inches)

Deep (40 to 60 inches)

Available Water Capacity

Low (2.6 inches)

Low (2.4 inches)

Water Retention Class

3 (0.8 inches)

3 (0.9 inches)

Hydrologic Soil Group

A

B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.10

0.10

Soil Productivity

Low

Low

Soil Manageability

Group

III

III

Class

3P

3P

Annual Forage Production (lb/acre)

200 to 400

200 to 400

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Lakash family, but with pumice parent material; a soil similar to the Lakash family, but with pumice over ashy texture; Aquandic Endoaquolls, on terraces adjacent to creeks & in meadows; & Rock outcrop, rhyolitic, on hillsides & hilltops. Included areas make up approximately 30 percent of the map unit area.

148 - Stecum - Salt Chuck families complex, 30 to 75 percent slopes

Elevation: 7,400 to 9,200 feet

Annual Precipitation: 12 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Stecum family

50 percent

Moraines

30 to 75 percent

Lodgepole Pine

Salt Chuck family

20 percent

Moraines

30 to 75 percent

Lodgepole Pine

Soil Profile Description

Surface Layer

0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5

0 to 14 inches; dark grayish brown & brown extremely stony loamy sand; single grain; loose; pH 5.9

Subsoil

9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5

—

Substratum

24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; soft; pH 5.5

14 to 33 inches; light yellowish brown & light gray very gravelly & extremely stony loamy sand; massive; slightly hard; pH 6.1

33 inches; soft decomposing granitic bedrock

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

33 inches (FB)

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Mod. Deep (20 to 40 inches)

Available Water Capacity

Very Low (2.0 inches)

Very Low (0.5 inches)

Water Retention Class

3 (0.8 inches)

3 (0.5 inches)

Hydrologic Soil Group

A

B-C

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Moderate to Very High

Moderate to Very High

Erosion Factor (k)

0.10

0.05

Soil Productivity

Low

Low

Soil Manageability

Group

IV

IV

Class

4EPg

4EPg

Annual Forage Production (lb/acre)

< 300

200 to 400

Forest Survey Site Class

6-7

6-7

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to Vitrandic Cryorthents, but with sandy-skeletal textures at depths greater than 25 inches; a soil similar to the Stecum family, but buried under 20 inches of pumice; Lithic Cryorthents, Vitrandic Cryopsamments, Nanamkin family & Rock outcrop. Included areas make up approximately 30 percent of the map unit area.

149 - Nanamkin family - Vitrandic Haploxerolls complex, 15 to 30 percent slopes

Elevation: 7,200 to 7,800 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Nanamkin family

50 percent

Mountain Toeslopes

15 to 30 percent

Lodgepole Pine

Vitrandic Haploxerolls, warm

30 percent

Mountain Toeslopes

15 to 30 percent

Jeffrey Pine

Soil Profile Description

Surface Layer

0 to 7 inches; brown very cobbly loamy sand; weak subangular blocky structure; soft; pH 7.0

1/4 to 0 inch; decomposing Big Sagebrush & Bitterbrush plant parts

Subsoil

—

—

Substratum

7 to 60 inches; yellowish brown very cobbly loamy sand; massive; soft; pH 7.0

0 to 10 inches; grayish brown gravelly coarse sand & loamy coarse sand; single grain & massive; loose & soft; pH 6.5
10 to 60 inches; light brownish, pinkish gray & pale brown gravelly coarse sand, loamy coarse sand & loamy sand; massive; soft; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Very Low (2.3 inches)

Low (3.4 inches)

Water Retention Class

3 (0.8 inches)

3 (1.1 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low

Erosion Factor (k)

0.05

0.10

Soil Productivity

Low

Low to Moderate

Soil Manageability

Group

III

III

Class

3Pe

3P

Annual Forage Production (lb/acre)

200 to 400

300 to 500

Forest Survey Site Class

6-7

5

Included Areas & Remarks

Included in this map unit are small areas of the Railcity & Lakash families. Included areas make up approximately 20 percent of the map unit area.

**150 - Vitrandic Cryopsamments - Vitrandic Cryorthents, ashy complex,
9 to 30 percent slopes**

Elevation: 8,400 to 9,100 feet

Annual Precipitation: 15 to 35 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Cryopsamments

40 percent

Hillsides & Mountainsides

9 to 30 percent

Lodgepole Pine

Vitrandic Cryorthents, ashy

35 percent

Mountainsides

9 to 30 percent

Lodgepole Pine

Soil Profile Description

Surface Layer

0 to 11 inches; grayish brown & light brownish gray loamy sand & gravelly coarse sand; massive; soft; pH 5.5 to 7.0

0 to 7 inches; grayish brown & pale brown gravelly sand; massive; soft; pH 6.0

Subsoil

—

—

Substratum

11 to 60 inches; light gray, light brownish gray, light brown & pale brown gravelly coarse sand & sand; massive; soft & slightly hard; pH 6.5 to 7.0

7 to 60 inches; light gray & white fine sand, sand, gravelly & extremely gravelly coarse sand; massive; soft; pH 6.0 to 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.1 inches)

Low (3.4 inches)

Water Retention Class

3 (1.2 inches)

2 (1.5 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.20

0.15

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

III

II

Class

3Pe

2ep

Annual Forage Production (lb/acre)

200 to 500

200 to 400

Forest Survey Site Class

6-NC

5-7

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xeropsamments, 30 to 60 percent slopes; Vitrandic Cryorthents, Vitrandic Xerorthents, ashy & Rock outcrop. Included areas make up approximately 25 percent of the map unit area.

151 - Vitrandic Xeropsamments, warm - Rock outcrop complex, 15 to 60 percent slopes

Elevation: 7,000 to 9,500 feet

Annual Precipitation: 10 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Xeropsamments, warm

50 percent

Mountainsides

15 to 60 percent

Jeffrey Pine

Rock outcrop

15 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 1 inch; grayish brown loamy fine sand; massive; soft; pH 6.0

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

1 to 60 inches; light brownish gray & light gray very gravelly & gravelly coarse sand; massive; soft; pH 6.5

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (3.7 inches)

—

Water Retention Class

2 (1.3 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low to High

—

Erosion Factor (k)

0.20

—

Soil Productivity

Very Low

—

Soil Manageability

Group

IV

—

Class

4EXgp

—

Annual Forage Production (lb/acre)

< 200

—

Forest Survey Site Class

5-7

—

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xeropsamments, warm, 0 to 15 percent slopes in valley bottoms & gentler mountainsides; Vitrandic Haploxerolls; Vitrandic Xerorthents; a soil similar to Vitrandic Xeropsamments, warm, but shallow to soft pumiceous tuff bedrock; a soil similar to Vitrandic Xeropsamments, warm, but shallow to hard bedrock, near rock outcroppings; and the Corbett family, 0 to 15 percent slopes, on mountain benches. Included areas make up approximately 35 percent of the map unit area.

152 - Vitrandic Cryopsamments - Rock outcrop complex, 15 to 30 percent slopes

Elevation: 8,800 to 9,700 feet

Annual Precipitation: 20 to 35 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Cryopsamments

50 percent

Mountainsides

15 to 30 percent

Lodgepole Pine

Rock outcrop, granitic

20 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 11 inches; grayish brown & light brownish gray loamy sand & gravelly coarse sand; massive; soft; pH 5.5 to 7.0

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

11 to 60 inches; light gray, light brownish gray, light brown & pale brown gravelly coarse sand & sand; massive; soft & slightly hard; pH 6.5 to 7.0

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (3.1 inches)

—

Water Retention Class

3 (1.2 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.20

—

Soil Productivity

Low to Moderate

—

Soil Manageability

Group

IV

—

Class

4PXe

—

Annual Forage Production (lb/acre)

200 to 500

—

Forest Survey Site Class

7-NC

—

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Cryopsamments, 30 to 60 percent slopes, on steeper mountainsides; the Stecum family; a soil similar to Vitrandic Cryopsamments, but underlain by glacial till at depths of greater than 40 inches; Vitrandic Cryorthents, ashy; and Vitrandic Cryorthents, pumiceous. Included areas make up approximately 30 percent of the map unit area.

153 - Vitrandic Cryopsamments - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 9,100 to 10,200 feet

Annual Precipitation: 20 to 40 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Cryopsamments

50 percent

Mountainsides

30 to 60 percent

Lodgepole Pine

Rock outcrop, granitic

20 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 11 inches; grayish brown & light brownish gray loamy sand & gravelly coarse sand; massive; soft; pH 5.5 to 7.0

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

11 to 60 inches; light gray, light brownish gray, light brown & pale brown gravelly coarse sand & sand; massive; soft & slightly hard; pH 6.5 to 7.0

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (3.1 inches)

—

Water Retention Class

3 (1.2 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Moderate to High

—

Erosion Factor (k)

0.20

—

Soil Productivity

Low to Moderate

—

Soil Manageability

Group

IV

—

Class

4EPXg

—

Annual Forage Production (lb/acre)

200 to 500

—

Forest Survey Site Class

7-NC

—

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Cryorthents; a soil similar to Vitrandic Cryopsamments, but underlain by to Vitrandic Cryopsamments, but Cryorthents, ashy. Included areas make up approximately 30 percent of the map unit area.

**154 - Vitrandic Cryorthents, pumiceous - Vitrandic Cryorthents - Rock outcrop complex,
30 to 60 percent slopes**

Elevation: 8,200 to 9,900 feet

Annual Precipitation: 12 to 45 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

**Vitrandic Cryorthents,
pumiceous**

35 percent

Mountainsides

30 to 60 percent

Lodgepole Pine

**Vitrandic
Cryorthents**

25 percent

Mountainsides

30 to 60 percent

Lodgepole Pine

Rock outcrop, granitic

20 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

1/2 to 0 inch; decomposing &
decomposed Lodgepole Pine
needles, twigs & cones

1 to 0 inch; decomposed &
decomposed Lodgepole Pine
needles, twigs & cones

Rock outcrop consists of
continuous bare bedrock & less
than 15 percent inclusions of soil
material capable of supporting
plants.

0 to 18 inches; light brownish gray
& pale brown very gravelly sand;
weak granular structure; soft; pH
5.0 to 5.5

0 to 2 inches; grayish brown very
gravelly coarse sand; massive;
soft; pH 5.5

Subsoil

—

—

—

Substratum

18 to 60 inches; light gray, dark
gray, light brownish gray & pale
brown gravelly sand, fine sand &
loamy fine sand; massive; soft; pH
6.0 to 6.5

2 to 60 inches; pale brown, light
brownish gray, dark gray &
pinkish gray very gravelly coarse
sand; massive; soft; pH 5.5 to
6.5

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

—

Effective Rooting Depth
(inches)

Very Deep (> 60 inches)

Mod. Deep (20 to 40 inches)

—

Available Water Capacity

Moderate (5.4 inches)

Very Low (1.6 inches)

—

Water Retention Class

2 (1.2 inches)

3 (0.9 inches)

—

Hydrologic Soil Group

A

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Very Rapid (20+ in./hr.)

—

Drainage Class

Somewhat Excessively

Somewhat Excessively

—

Max Erosion Hazard

Moderate to High

Moderate to High

—

Erosion Factor (k)

0.10

0.10

—

Soil Productivity

Low

Very Low

—

Soil Manageability

Group

IV

IV

—

Class

4EXgp

4EPXg

—

Annual Forage Production
(lb/acre)

200 to 400

< 200

—

Forest Survey Site Class

5-7

5-7

—

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Cryorthents, pumiceous, 60 to 80 percent slopes, on steeper mountainsides; Vitrandic Cryorthents, 60 to 80 percent slopes, on steeper mountainsides; Vitrandic Cryorthents, ashy; & Vitrandic Cryopsamments. Included areas make up approximately 20 percent of the map unit area.

155 - Aquandic Endoaquolls, 0 to 5 percent slopes

Elevation: 7,800 to 8,100 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Aquandic Endoaquolls

75 percent

Concave Sand Flats

0 to 5 percent

Sedge - Rush & Big Sagebrush

Soil Profile Description

Surface Layer

3 to 0 inches; gass litter & a thick matting of grass roots.

0 to 28 inches; gray gravelly loamy sand; massive; slightly hard; pH 6.5.

Subsoil

—

Substratum

28 to 60 inches; brown gravelly loamy coarse sand; single grain; loose; pH 6.7

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth
(inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.7 inches)

Water Retention Class

3 (1.2 inches)

Hydrologic Soil Group

B-C

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Poorly

Max Erosion Hazard

Low to High

Erosion Factor (k)

0.10

Soil Productivity

Low to High

Soil Manageability

Group

IV

Class

4PW

Annual Forage Production
(lb/acre)

200 to 1,500

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Fez family, 5 to 30 percent slopes, on adjacent mountainsides; the Brantel & Lakash families in higher convex areas of sand flats. Meadow system streams may be incised, which may lower the watertable and reduce sedge and grass distribution, and promote a high erosion hazard rating. Included areas make up approximately 25 percent of the map unit area.

156 - Charcol - Cowood families complex, 2 to 30 percent slopes

Elevation: 7,400 to 10,000 feet

Annual Precipitation: 10 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Charcol family

50 percent

Mountainsides & Mountain Benches

2 to 30 percent

Whitebark Pine

Cowood family

20 percent

Mountain Benches, near Rock Outcroppings

2 to 30 percent

Big Sagebrush

Soil Profile Description

Surface Layer

1 to 0 inch; decomposing Big Sagebrush plant parts

0 to 5 inches; dark grayish brown extremely stony loamy coarse sand & sandy loam; single grain & weak subangular blocky structure; loose & soft; pH 6.4

Subsoil

0 to 23 inches; brown gravelly & very gravelly sandy loam; massive; soft; pH 7.0

23 to 60 inches; brown & yellowish brown gravelly & very gravelly heavy sandy loam; massive; soft; pH 6.5

5 to 11 inches; yellowish brown extremely stony sandy loam; moderate subangular blocky structure; soft; pH 6.3

Substratum

—

11 inches; hard adamellite bedrock

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

11 inches (HB)

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Shallow (10 to 20 inches)

Available Water Capacity

Moderate (4.7 inches)

Very Low (0.3 inches)

Water Retention Class

2 (1.8 inches)

3 (0.3 inches)

Hydrologic Soil Group

B

C-D

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Well

Well

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.24

0.05

Soil Productivity

Moderate

Low

Soil Manageability

Group

II

IV

Class

2epx

4PXed

Annual Forage Production (lb/acre)

300 to 500

200 to 400

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Charcol family, but shallow to fractured bedrock, on mountainsides; Lithic Cryorthents, on mountainsides; & Rock outcrop, on mountainsides & ridges. Included areas make up approximately 30 percent of the map unit area.

157 - Stecum - Guiser families - Rock outcrop complex, 15 to 60 percent slopes

Elevation: 7,600 to 11,200 feet

Annual Precipitation: 12 to 30 inches

Soil Map Unit Components	Stecum family	Guiser family	Rock outcrop, granitic
Approx Proportion	40 percent	20 percent	15 percent
Landscape Position	Mountainsides & Benches	Mountainsides & Benches	Mountainsides, Ridges, Bluffs & Edges of Plateaus
Slope	15 to 60 percent	15 to 60 percent	—
Typical Vegetation	Whitebark Pine	Whitebark Pine	Barren

Soil Profile Description

Surface Layer	0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5	2 to 0 inch; decomposing Lodgepole & Whitebark Pine twigs, needles & cones 0 to 9 inches; brown gravelly loamy sand; massive; soft; pH 6.0	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5	9 to 47 inches; yellowish brown & reddish yellow very gravelly sandy loam; massive; soft; pH 5.5 to 6.0	—
Substratum	24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; pH 5.5	47 to 60 inches; yellowish brown very gravelly sandy loam; massive; soft; pH 5.5	—

Soil Properties

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (2.0 inches)	Low (3.8 inches)	—
Water Retention Class	3 (0.8 inches)	3 (1.0 inches)	—
Hydrologic Soil Group	A	B	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—
Drainage Class	Somewhat Excessively	Somewhat Excessively	—
Max Erosion Hazard	Low to High	Low to High	—
Erosion Factor (k)	0.10	0.15	—
Soil Productivity	Low	Moderate	—
Soil Manageability			
Group	IV	IV	—
Class	4EPgx	4EPgx	—
Annual Forage Production (lb/acre)	< 300	200 to 400	—
Forest Survey Site Class	NC	NC	—

Included Areas & Remarks

Included in this map unit are small areas of Lithic Cryorthents, ridges & adjacent to rock outcroppings; the Charcol family, 15 to 30 percent slopes, in riparian areas; the Cowood family, near rock outcroppings; & Aquic Cryoborolls, 15 to 30 percent slopes, in riparian areas. Included areas make up approximately 25 percent of the map unit area.

158 - Stecum - Charcol families - Rock outcrop complex, 30 to 70 percent slopes

Elevation: 6,800 to 10,000 feet Annual Precipitation: 8 to 25 inches

Soil Map Unit Components	Stecum family	Charcol family	Rock outcrop, granitic
Approx Proportion	35 percent	25 percent	15 percent
Landscape Position	Moraines & Mountainsides	Moraines & Mountainsides	Mountainsides & Ridges
Slope	30 to 70 percent	30 to 70 percent	—
Typical Vegetation	Lodgepole Pine	Whitebark Pine	Barren

Soil Profile Description

Surface Layer	0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5	1 to 0 inch; decomposing Big Sagebrush plant parts 0 to 23 inches; brown gravelly & very gravelly sandy loam; massive; soft; pH 7.0	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5	23 to 60 inches; brown & yellowish brown gravelly & very gravelly heavy sandy loam; massive; soft; pH 6.5	—
Substratum	24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; soft; pH 5.5	—	—

Soil Properties

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (2.0 inches)	Moderate (4.7 inches)	—
Water Retention Class	3 (0.8 inches)	2 (1.8 inches)	—
Hydrologic Soil Group	A	B	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—
Drainage Class	Somewhat Excessively	Well	—
Max Erosion Hazard	Moderate to Very High	Moderate to Very High	—
Erosion Factor (k)	0.10	0.24	—
Soil Productivity	Low	Moderate	—
Soil Manageability Group	IV	III	—
Class	4EPgx	3Egpx	—
Annual Forage Production (lb/acre)	< 300	300 to 500	—
Forest Survey Site Class	NC	NC	—

Included Areas & Remarks

Included in this map unit are small areas of the Nanmakin family, on mountainsides & moraines, at lower elevations; Lithic Cryorthents, near rock outcroppings; Aquic Cryoborolls, 15 to 30 percent slopes, in riparian areas; the Charcol family, 15 to 30 percent slopes, on moraine toeslopes; a soil similar to the Charcol family, but with a thinner dark surface layer, on mountainsides; a soil similar to the Charcol family, but with sandy-skeletal textures, 15 to 30 percent slopes, on mountain toeslopes. Included areas make up approximately 25 percent of the map unit area.

159 - Aquic Cryoborolls, 5 to 30 percent slopes

Elevation: 7,300 to 10,600 feet

Annual Precipitation: 10 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Aquic Cryoborolls

80 percent

Mountain Basins

5 to 30 percent

Sedges, Grasses and Willows

Soil Profile Description

Surface Layer

0 to 21 inches; brown & grayish brown sand & loamy sand; single grain; soft; pH 6.5

Subsoil

—

Substratum

21 to 43+ inches; brown & varigated dark gray & pale brown loamy sand, gravelly sand & gravelly coarse sand; single grain; soft; pH 5.5 to 6.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth
(inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.7 inches)

Water Retention Class

2 (1.4 inches)

Hydrologic Soil Group

C-D

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Poorly

Max Erosion Hazard

Low to High

Erosion Factor (k)

0.17

Soil Productivity

Low to High

Soil Manageability

Group

III

Class

3EWps

Annual Forage Production
(lb/acre)

200 to 1,500

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Stecum & Haypress families, on mountainsides. Meadow system streams may be incised, which may lower the watertable and reduce sedge and grass distribution, and promote a higher erosion hazard rating. Included areas make up approximately 20 percent of the map unit area.

160 - Haypress family, 30 to 60 percent slopes

Elevation: 7,800 to 9,600 feet

Annual Precipitation: 15 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Haypress family

75 percent

Mountainsides & Glacial Debris

30 to 60 percent

Quaking Aspen

Soil Profile Description

Surface Layer

1 to 0 inch; decomposing Aspen plant parts

0 to 22 inches; grayish brown & pale brown loamy sand; massive; soft; pH 7.0

Subsoil

—

Substratum

22 to 60 inches; brown, yellowish brown & strong brown very bouldery loamy sand & gravelly loamy sand; massive; soft; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.8 inches)

Water Retention Class

2 (1.8 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Erosion Factor (k)

0.20

Soil Productivity

Moderate

Soil Manageability

Group

III

Class

3Egp

Annual Forage Production (lb/acre)

800 to 1500

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Corbett, Chesaw & Nanamkin families, on mountainsides. Included areas make up approximately 25 percent of the map unit area.

161 - Torriorthentic Haploxerolls, 2 to 30 percent slopes

Elevation: 6,800 to 7,200 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Torriorthentic Haploxerolls

65 percent

Terraces & Moraines

2 to 30 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 3 inches; brown gravelly sandy loam; single grain; loose; pH 6.5

Subsoil

3 to 20 inches; brown gravelly sandy loam; single grain; loose; pH 6.7 to 7.0

Substratum

20 to 60 inches; yellowish brown very cobbly sandy loam; massive; very hard; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.4 inches)

Water Retention Class

2 (1.8 inches)

Hydrologic Soil Group

B

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Erosion Factor (k)

0.22

Soil Productivity

Moderate

Soil Manageability

Group

II

Class

2ep

Annual Forage Production (lb/acre)

400 to 800

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to Torriorthentic Haploxerolls, but with sandy-skeletal textures, on terraces; the Kiona family, on terraces; the Brantel family, on stream terraces, adjacent to the edges of the unit; Yellowhills family, on terraces; Vitrandic Xerofluvents, on stream terraces adjacent to edges of the unit; a soil similar to the Abgese family, but with rock fragments in the profile, on terraces & moraines; & Rock outcrop, on terraces & moraines. Included areas make up approximately 35 percent of the map unit area.

162 - Torriorthentic Haploxerolls - Rock outcrop complex, 2 to 15 percent slopes

Elevation: 6,900 to 7,100 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Torriorthentic Haploxerolls

40 percent

Hillsides & Hilltops

2 to 15 percent

Big Sagebrush

Rock outcrop

30 percent

Hilltops & Hillsides

—

Barren

Soil Profile Description

Surface Layer

0 to 3 inches; brown gravelly sandy loam; single grain; loose; pH 6.5

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

3 to 20 inches; brown gravelly sandy loam; single grain; loose; pH 6.7 to 7.0

—

Substratum

20 to 60 inches; yellowish brown very cobbly sandy loam; massive; very hard; pH 7.0

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Moderate (5.4 inches)

—

Water Retention Class

2 (1.8 inches)

—

Hydrologic Soil Group

B

—

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low

—

Erosion Factor (k)

0.22

—

Soil Productivity

Moderate

—

Soil Manageability

Group

II

—

Class

2p

—

Annual Forage Production (lb/acre)

400 to 800

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to Torriorthentic Haploxerolls, but with sandy-skeletal textures; the Jaybee, Wrango, Fez & Buscones families. Included areas make up approximately 30 percent of the map unit area.

163 - Yellowhills - Brantel families complex, 2 to 5 percent slopes

Elevation: 7,000 to 7,400 feet

Annual Precipitation: 10 to 12 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Yellowhills family

70 percent

Valleys

2 to 5 percent

Bitterbrush

Brantel family

15 percent

Valleys

2 to 5 percent

Bitterbrush

Soil Profile Description

Surface Layer

0 to 5 inches; grayish brown gravelly coarse sand & sand; single grain & massive; loose & soft; pH 6.0

0 to 9 inches; light brownish gray & light gray coarse sand & gravelly loamy coarse sand; massive; soft; pH 5.0

Subsoil

—

—

Substratum

5 to 60 inches; brown & yellowish brown loamy sand; massive; soft; pH 6.5 to 7.0

9 to 60 inches; white, light gray, dark gray & black gravelly coarse sand & loamy coarse sand & gravel; massive; single grain & platy structure; soft; pH 5.5 to 7.2

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Deep (40 to 60 inches)

Available Water Capacity

Moderate (5.1 inches)

Low (2.4 inches)

Water Retention Class

2 (1.6 inches)

3 (0.9 inches)

Hydrologic Soil Group

A

B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.10

0.10

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

II

III

Class

2p

3P

Annual Forage Production (lb/acre)

300 to 600

200 to 400

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of Torriorthentic Haploxerolls, on valley edges; the Cozetica family; & Vitrandic Xeropsamments. Included areas make up approximately 15 percent of the map unit area.

164 - Vitrandic Xerochrepts - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 7,500 to 8,000 feet

Annual Precipitation: 12 to 30 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Xerochrepts

50 percent

Mountainsides & Moraines

30 to 60 percent

Red Fir

Rock outcrop, rhyolitic

20 percent

Mountainsides & Moraines

—

Barren

Soil Profile Description

Surface Layer

0 to 1 inch; grayish brown gravelly coarse sand; single grain; loose; pH 6.5

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

1 to 60 inches; white, yellow, light gray, pale brown & brown gravel, gravelly & extremely cobbly loamy sand; extremely cobbly sandy loam & silt loam; massive & single grain; soft & loose; pH 6.0 to 7.0

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (2.9 inches)

—

Water Retention Class

3 (0.5 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Moderate (0.6 to 2 in./hr)

—

Drainage Class

Well

—

Max Erosion Hazard

Moderate to high

—

Erosion Factor (k)

0.10

—

Soil Productivity

Low

—

Soil Manageability

Group

IV

—

Class

4EPXg

—

Annual Forage Production (lb/acre)

< 200

—

Forest Survey Site Class

5-7

—

Included Areas & Remarks

Included in this map unit are small areas of the Stecum family, at higher elevations; Vitrandic Xerorthents, Vitrandic Xerorthents, pumiceous & Vitrandic Xerorthents, ashy. Included areas make up approximately 30 percent of the map unit area.

169 - Vitrandic Xerofluvents, 0 to 15 percent slopes

Elevation: 6,800 to 7,000 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components

Approx Proportion

Vitrandic Xerofluvents

85 percent

Landscape Position

Mountain Basins

Slope

0 to 15 percent

Typical Vegetation

Big Sagebrush

Soil Profile Description

Surface Layer

1 to 0 inch; decomposed & decomposing Big Sagebrush twigs & leaves

0 to 12 inches; dark gray sandy loam; single grain, massive; soft; pH 6.5 to 7.0

Subsoil

—

Substratum

12 to 60 inches; gray sandy loam, loamy sand & coarse sand; massive; soft; pH 7.5 to 8.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.7 inches)

Water Retention Class

2 (1.4 inches)

Hydrologic Soil Group

A-B

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Erosion Factor (k)

0.20

Soil Productivity

Low

Soil Manageability

Group

II

Class

2ep

Annual Forage Production (lb/acre)

200 to 500

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Yellowhills family, in higher areas, on fringes of basins; the Brantel family, in higher areas, on fringes of basins; & a soil similar to the yellowhills family, but with granitic parent material, on fringes of basins. Meadow system streams may be incised, which may lower the watertable and reduce sedge and grass distribution, and promote a high erosion hazard rating. Included areas make up approximately 15 percent of the map unit area.

170 - Springmeyer family, 30 to 60 percent slopes

Elevation: 6,800 to 7,200 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Springmeyer family

85 percent

Mountainsides

30 to 60 percent

Bitterbrush

Soil Profile Description

Surface Layer

0 to 13 inches; grayish brown & brown gravelly sand; massive and single grain; soft & loose; pH 7.0 to 7.5

Subsoil

13 to 32 inches; brown, olive brown & light brownish gray sandy loam & clay loam; massive; soft & slightly hard; pH 7.5

Substratum

32 to 60 inches; soft fractured paralithic tuff

Soil Properties

Restrictive Layer Depth

32 to 60 inches (PC)

Effective Rooting Depth (inches)

Mod. Deep to Deep (20 to 60 in)

Available Water Capacity

Low (3.2 inches)

Water Retention Class

2 (1.4 inches)

Hydrologic Soil Group

B-C

Permeability (in./hr.)

Mod. Slow (0.2 to 0.6 in./hr)

Drainage Class

Well

Max Erosion Hazard

Moderate to High

Erosion Factor (k)

0.15

Soil Productivity

Low to Moderate

Soil Manageability

Group

III

Class

3Egp

Annual Forage Production (lb/acre)

200 to 800

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Abgese & Calpine families. Included areas make up approximately 15 percent of the map unit area.

171 - Sumine family - Rock outcrop complex, 2 to 30 percent slopes

Elevation: 7,600 to 9,400 feet

Annual Precipitation: 12 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Sumine family

60 percent

Mountainsides & Benches

2 to 30 percent

Bitterbrush

Rock outcrop, basalt

20 percent

Mountain Ridges & Mountainsides

—

Barren

Soil Profile Description

Surface Layer

1/4 to 0 inch; fresh & decomposing shrub parts

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 27 inches; grayish brown gravelly loamy coarse sand; single grain; loose; pH 6.2

Subsoil

27 to 60 inches; pale brown very gravelly sandy loam; moderate subangular blocky structure; slightly hard; pH 6.5

—

Substratum

—

—

Soil Properties

Restrictive Layer Depth

Greater than 60 Inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (3.8 inches)

—

Water Retention Class

2 (2.0 inches)

—

Hydrologic Soil Group

B

—

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

—

Drainage Class

Well

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.15

—

Soil Productivity

Low

—

Soil Manageability

Group

II

—

Class

2ep

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

7-NC

—

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Sur family, but cooler, on mountainsides; & the Bearskin family, near rock outcroppings. Included areas make up approximately 20 percent of the map unit area.

172 - Calpine - Mottsville families association, 2 to 30 percent slopes

Elevation: 6,800 to 7,000 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Calpine family

50 percent

Undulating Terrace Tops

2 to 15 percent slopes

Big Sagebrush

Mottsville family

35 percent

Terrace Sideslopes

15 to 30 percent slopes

Big Sagebrush

Soil Profile Description

Surface Layer

1/4 to 0 inch; decomposing Big Sagebrush leaves & twigs

1/4 to 0 inch; decomposing Sagebrush leaves & twigs

0 to 15 inches; grayish brown & brown gravelly sandy loam; weak granular structure; soft; pH 6.8

0 to 19 inches; grayish brown gravelly sandy loam & loamy coarse sand; weak granular structure; soft; pH 6.0 to 6.5

Subsoil

15 to 39 inches; pale brown gravelly & very gravelly sandy loam; massive; hard; pH 6.5

19 to 25 inches; grayish brown gravelly coarse sand; weak subangular blocky structure; soft; pH 6.8

Substratum

39 to 60 inches; pale brown very gravelly sand loam; massive; hard; pH 6.5

25 to 60 inches; grayish brown gravelly loamy sand; weak subangular blocky structure; soft; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.1 inches)

Low (3.2 inches)

Water Retention Class

2 (1.9 inches)

3 (1.2 inches)

Hydrologic Soil Group

B

A

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Well

Somewhat Excessively

Max Erosion Hazard

Low

Low to Moderate

Erosion Factor (k)

0.25

0.25

Soil Productivity

Low to Moderate

Low to Moderate

Soil Manageability

Group

II

III

Class

2p

3Pe

Annual Forage Production (lb/acre)

300 to 600

200 to 500

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Berent family, 2 to 15 percent slopes, on undulating terraces; & the Preston family, 15 to 30 percent slopes, on terrace sideslopes. Included areas make up approximately 15 percent of the map unit area.

173 - Fez family - Vitrandic Xeropsamments complex, 30 to 60 percent slopes

Elevation: 8,000 to 9,300 feet

Annual Precipitation: 15 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Fez family

60 percent

Hillsides

30 to 60 percent

Quaking Aspen

Vitrandic Xeropsamments

25 percent

Hillsides

30 to 60 percent

Lodgepole Pine

Soil Profile Description

Surface Layer

1 to 0 inch; decomposing Aspen leaves & twigs

0 to 10 inches; grayish brown & brown sand; massive; soft; pH 6.0

2 to 0 inch; decomposing Red Fir & Jeffrey Pine needles & twigs

0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 5.6

Subsoil

—

—

Substratum

10 to 60 inches; brown & light yellowish brown sand; massive; soft; pH 6.0

7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.4 inches)

Moderate (4.4 inches)

Water Retention Class

2 (1.9 inches)

2 (1.4 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Moderate to High

Erosion Factor (k)

0.14

0.15

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

II

II

Class

3Egp

3Egp

Annual Forage Production (lb/acre)

400 to 800

200 to 400

Forest Survey Site Class

NC

4-6

Included Areas & Remarks

Included in this map unit are small areas of Rock outcrop, on hillsides & ridges; & Vitrandic Xerorthents, ashy. Included areas make up approximately 15 percent of the map unit area.

174 - Torriorthentic Haploxerolls - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 7,000 to 8,400 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components

Approx Proportion

Torriorthentic Haploxerolls

60 percent

Landscape Position

Mountainsides & Moraines

Slope

30 to 60 percent

Typical Vegetation

Big Sagebrush

Rock outcrop, metasedimentary & granitic

20 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 3 inches; brown gravelly sandy loam; single grain; loose; pH 6.5

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

3 to 20 inches; brown gravelly sandy loam; single grain; loose; pH 6.7 to 7.0

—

Substratum

20 to 60 inches; yellowish brown very cobbly sandy loam; massive; very hard; pH 7.0

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Moderate (5.4 inches)

—

Water Retention Class

2 (1.8 inches)

—

Hydrologic Soil Group

B

—

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Moderate to High

—

Erosion Factor (k)

0.22

—

Soil Productivity

Moderate

—

Soil Manageability

Group

III

—

Class

4EXgp

—

Annual Forage Production (lb/acre)

400 to 800

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of Torriorthentic Haploxerolls, 2 to 15 percent slopes, on gentle mountainsides & moraines; & a soil similar to Torriorthentic Haploxerolls, but with a sandy-skeletal texture, on mountainsides & moraines. Included areas make up approximately 20 percent of the map unit area.

175 - Calpine family, 5 to 30 percent slopes

Elevation: 6,900 to 7,600 feet

Annual Precipitation: 8 to 15 inches

Soil Map Unit Components

Approx Proportion

Calpine family

70 percent

Landscape Position

Valley Fill Areas

Slope

5 to 30 percent

Typical Vegetation

Big Sagebrush

Soil Profile Description

Surface Layer

1/4 to 0 inch; decomposing Big Sagebrush leaves & twigs

Subsoil

0 to 15 inches; grayish brown & brown gravelly sandy loam; weak granular structure; soft; pH 6.8

Substratum

15 to 39 inches; pale brown gravelly & very gravelly sandy loam; massive; hard; pH 6.5

39 to 60 inches; pale brown very gravelly sandy loam; massive; hard; pH 6.5

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.1 inches)

Water Retention Class

2 (1.9 inches)

Hydrologic Soil Group

B

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Well

Max Erosion Hazard

Low to Moderate

Erosion Factor (k)

0.25

Soil Productivity

Low to Moderate

Soil Manageability

Group

II

Class

2ep

Annual Forage Production (lb/acre)

300 to 600

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Glean family, 5 to 15 percent slopes, on basalt flow terraces; the Mottsville family, in valleys; the Berent family, in valleys; & the Calpine family, 30 to 60 percent slopes, on adjacent mountainsides. Included areas make up approximately 30 percent of the map unit area.

176 - Calpine family - Rock outcrop complex, 0 to 15 percent slopes

Elevation: 6,800 to 7,200 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Calpine family

50 percent

Terraces

0 to 15 percent

Big Sagebrush

Rock outcrop, rhyolitic

25 percent

Terraces

—

Barren

Soil Profile Description

Surface Layer

1/4 to 0 inch; decomposing Big Sagebrush leaves & twigs

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 15 inches; grayish brown & brown gravelly sandy loam; weak granular structure; soft; pH 6.8

Subsoil

15 to 39 inches; pale brown gravelly & very gravelly sandy loam; massive; hard; pH 6.5

—

Substratum

39 to 60 inches; pale brown very gravelly sandy loam; massive; hard; pH 6.5

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Moderate (5.1 inches)

—

Water Retention Class

2 (1.9 inches)

—

Hydrologic Soil Group

B

—

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

—

Drainage Class

Well

—

Max Erosion Hazard

Low

—

Erosion Factor (k)

0.25

—

Soil Productivity

Low to Moderate

—

Soil Manageability

Group

II

—

Class

3Xp

—

Annual Forage Production (lb/acre)

300 to 600

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Berent, Mottsville, Wrango, Brantel & Kiona families. Included areas make up approximately 25 percent of the map unit area.

177 - Torriorthentic Haploxerolls - Mottsville family association, 15 to 60 percent slopes

Elevation: 7,500 to 8,500 feet

Annual Precipitation: 10 to 17 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Torriorthentic Haploxerolls

50 percent

Mountainsides

30 to 60 percent

Pinyon Pine

Mottsville family

15 percent

Mountain Toeslopes

15 to 30 percent

Pinyon Pine

Soil Profile Description

Surface Layer

0 to 3 inches; brown gravelly sandy loam; single grain; loose; pH 6.5

1/4 to 0 inch; decomposing Big Sagebrush leaves & twigs

Subsoil

3 to 20 inches; brown gravelly sandy loam; single grain; loose; pH 6.7 to 7.0

0 to 19 inches; grayish brown gravelly sand loam & loamy coarse sand; weak granular structure; soft; pH 6.0 to 6.5

Substratum

20 to 60 inches; yellowish brown very cobbly sandy loam; massive; very hard; pH 7.0

19 to 25 inches; grayish brown gravelly coarse sand; weak subangular blocky structure; soft; pH 6.8

25 to 60 inches; grayish brown gravelly loamy sand; weak subangular blocky structure; soft; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.4 inches)

Low (3.2 inches)

Water Retention Class

2 (1.8 inches)

3 (1.2 inches)

Hydrologic Soil Group

B

A

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Low to Moderate

Erosion Factor (k)

0.22

0.25

Soil Productivity

Moderate

Low to Moderate

Soil Manageability

Group

III

III

Class

3Egpx

3Pe

Annual Forage Production (lb/acre)

400 to 800

200 to 500

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Railcity, Wrango, Corbett & Powment families, & Rock outcrop, on mountainsides & ridges. Included areas make up approximately 35 percent of the map unit area.

200 - Nanamkin family, 2 to 60 percent slopes

Elevation: 8,000 to 8,900 feet

Annual Precipitation: 15 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Nanamkin family

70 percent

Moraines & Moraine Basins

2 to 60 percent

Lodgepole Pine

Soil Profile Description

Surface Layer

0 to 7 inches; brown very cobbly loamy sand;
weak subangular blocky structure; soft; pH 7.0

Subsoil

—

Substratum

7 to 60 inches; yellowish brown very cobbly loamy
sand; massive; soft; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth
(inches)

Very Deep (> 60 inches)

Available Water Capacity

Very Low (2.3 inches)

Water Retention Class

3 (0.8 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low to High

Erosion Factor (k)

0.05

Soil Productivity

Low

Soil Manageability

Group

IV

Class

4EPgx

Annual Forage Production
(lb/acre)

200 to 400

Forest Survey Site Class

6-7

Included Areas & Remarks

Included in this map unit are small areas of the Chesaw family, 10 to 35 percent slopes, in moraine basins, riparian corridors & lake fringes; the Stecum family, 30 to 60 percent slopes, on fringes of moraine sideslopes & on moraine sideslopes; the Glean family, 2 to 15 percent slopes, in moraine basins; & a soil similar to the Nanamkin family, but with a loamy-skeletal textural control section. Included areas make up approximately 30 percent of the map unit area.

201 - Rubbleland - Stecum family - Lithic Cryorthents association, 30 to 80 percent slopes

Elevation: 8,400 to 11,800 feet

Annual Precipitation: 15 to 30 inches

Soil Map Unit Components	Rubbleland	Stecum family	Lithic Cryorthents
Approx Proportion	40 percent	20 percent	15 percent
Landscape Position	Mountainsides	Lower Mountainsides, adjacent to Rubbleland	Upper Mountainsides, adjacent to Rock outcrop
Slope	—	30 to 80 percent	50 to 80 percent
Typical Vegetation	Barren	Whitebark Pine	Whitebark Pine
Soil Profile Description			
Surface Layer	Rubbleland consists of areas of detached rock fragments (colluvium) which have accumulated on mountainsides & moraine sideslopes as talus. These areas support little or no vegetation & are subject to landslides.	0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5	0 to 2 inches; pale brown extremely stony loamy sand; single grain; loose; pH 6.0.
Subsoil	—	9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5	—
Substratum	—	24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; soft; pH 5.5	2 to 18 inches; pale brown very stony loamy & gravelly loamy sand; massive; soft; pH 6.4 18 inches; hard granitic bedrock
Soil Properties			
Restrictive Layer Depth	—	Greater than 60 inches	16 to 18 inches (HB)
Effective Rooting Depth (inches)	—	Very Deep (> 60 inches)	Shallow (10 to 20 inches)
Available Water Capacity	—	Very Low (2.0 inches)	Very Low (0.7 inches)
Water Retention Class	—	3 (0.8 inches)	3 (0.7 inches)
Hydrologic Soil Group	—	A	B-C
Permeability (in./hr.)	—	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)
Drainage Class	—	Somewhat Excessively	Somewhat Excessively
Max Erosion Hazard	—	Moderate to Very High	High To Very High
Erosion Factor (k)	—	0.10	0.05
Soil Productivity	—	Low	Low
Soil Manageability	—	—	—
Group	—	IV	IV
Class	—	4EPXg	4GEPXd
Annual Forage Production (lb/acre)	—	< 300	200 to 400
Forest Survey Site Class	—	NC	NC

Included Areas & Remarks

Included in this map unit are small areas of Rock outcrop, on ridges & mountainsides; the Nanamkin family, at lower elevations; & a soil similar to Lithic Cryorthents, but with loamy- skeletal textures. Included areas make up approximately 25 percent of the map unit area.

203 - Chesaw family, 60 to 80 percent slopes

Elevation: 8,000 to 9,800 feet

Annual Precipitation: 15 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Chesaw family

65 percent

Mountainsides, in avalanche shoots

60 to 80 percent

Quaking Aspen

Soil Profile Description

Surface Layer

1/2 to 0 inch; decomposing Bitterbrush & Sagebrush leaves & grass stems

0 to 13 inches; brown loamy fine sand & gravelly loamy coarse sand; weak granular structure; soft; pH 6.5

Subsoil

—

Substratum

13 to 60 inches; pale brown & light yellowish brown gravelly loamy coarse sand & very cobbly loamy sand; weak granular structure; soft; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.0 inches)

Water Retention Class

3 (1.0 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Very High

Erosion Factor (k)

0.10

Soil Productivity

Low to Moderate

Soil Manageability

Group

IV

Class

4GSEPx

Annual Forage Production (lb/acre)

300 to 600

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Biglake family, 30 to 60 percent slopes, on mountainsides; Rubbleland, on mountainsides; fractured Rock outcrop, on ridges & mountainsides; the Stecum & Nanamkin family. Included areas make up approximately 35 percent of the map unit area.

204 - Nanamkin - Corbett families association, 30 to 60 percent slopes

Elevation: 7,600 to 8,000 feet

Annual Precipitation: 12 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Nanamkin family

60 percent

Moraine Sideslopes

30 to 60 percent

Mountain Mahogany & Lodgepole Pine

Corbett family

20 percent

Smoother Moraine Sideslopes & Basins

30 to 50 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 7 inches; brown very cobbly loamy sand; weak subangular blocky structure; soft; pH 7.0

0 to 3 inches; light brownish gray gravelly loamy sand; weak subangular blocky structure; soft; pH 6.0

Subsoil

—

—

Substratum

7 to 60 inches; yellowish brown very cobbly loamy sand; massive; soft; pH 7.0

3 to 52 inches; light gray & white gravelly loamy sand & extremely gravelly loamy sand; massive; soft; pH 6.5

52 inches; soft rhyolitic tuff

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

52 inches (FB)

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Deep (40 to 60 inches)

Available Water Capacity

Very Low (2.3 inches)

Low (2.4 inches)

Water Retention Class

3 (0.8 inches)

3 (1.1 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Moderate to High

Erosion Factor (k)

0.05

0.17

Soil Productivity

Low

Very Low

Soil Manageability

Group

IV

IV

Class

4EPgx

4EPg

Annual Forage Production (lb/acre)

200 to 400

< 200

Forest Survey Site Class

7-NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Chesaw family & Haypress families, in riparian corridors. Included areas make up approximately 20 percent of the map unit area.

205 - Rubbleland - Nanamkin - Glean families complex, 30 to 80 percent slopes

Elevation: 7,800 to 9,600 feet

Annual Precipitation: 15 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Rubbleland

40 percent

Talus Slopes

—

Barren

Nanamkin family

15 percent

Moraine Sideslopes, Ridges & Depressions

30 to 80 percent

Mixed Conifer-Fir

Glean family

15 percent

Moraine Sideslopes & Ridges

30 to 60 percent

Mixed Conifer-Fir

Soil Profile Description

Surface Layer

Rubbleland consists of areas of detached rock fragments (colluvium) which have accumulated on mountainsides & moraine sideslopes as talus. These areas support little or no vegetation & are subject to landslides.

0 to 7 inches; brown very cobbly loamy sand; weak subangular blocky structure; soft; pH 7.0

0 to 1 inch; dark grayish brown extremely stony loamy sand; single grain; loose; pH 6.4

Subsoil

—

—

1 to 15 inches; brown very stony & very cobbly sandy loam; weak granular structure; soft; pH 6.7

Substratum

—

7 to 60 inches; yellowish brown very cobbly loamy sand; massive; soft; pH 7.0

15 to 60 inches; brown very cobbly sandy loam; massive; soft; pH 6.9

Soil Properties

Restrictive Layer Depth

—

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

—

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

—

Very Low (2.3 inches)

Moderate (4.4 inches)

Water Retention Class

—

3 (0.8 inches)

2 (1.3 inches)

Hydrologic Soil Group

—

A

B

Permeability (in./hr.)

—

Rapid (6 to 20 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

—

Somewhat Excessively

Well

Max Erosion Hazard

—

Moderate to Very High

Moderate to High

Erosion Factor (k)

—

0.05

0.05

Soil Productivity

—

Low

Moderate

Soil Manageability

Group

—

IV

III

Class

—

4EPXg

3EXgp

Annual Forage Production (lb/acre)

—

200 to 400

400 to 800

Forest Survey Site Class

—

5-7

5-7

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Nanamkin family, but less than 20 inches to bedrock, 30 to 80 percent slopes, on moraine sideslopes; a soil similar to the Glean family, but with a high admixture of pumice, 30 to 60 percent slopes, on moraine sideslopes & ridges; the Chesaw family, 30 to 60 percent slopes, in moraine depressions; & a soil similar to the Glean family, but with ashy-skeletal material in the upper 20 inches of the soil, 60 to 80 percent slopes, on talus slopes. Included areas make up approximately 30 percent of the map unit area.

206 - Stecum - Charcol families - Rock outcrop association, 2 to 50 percent slopes

Elevation: 7,600 to 8,000 feet

Annual Precipitation: 12 to 15 inches

Soil Map Unit Components	Stecum family	Charcol family	Rock outcrop, mixed
Approx Proportion	40 percent	20 percent	20 percent
Landscape Position	Moraine Sideslopes & Riparian Areas	Basins, Moraine Toeslopes & Riparian Areas	Exposed Ridges & Moraine Sideslopes
Slope	10 to 50 percent	2 to 15 percent	—
Typical Vegetation	Lodgepole Pine & Quaking Aspen	Western White Pine	Barren

Soil Profile Description

Surface Layer	0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5	1 to 0 inch; decomposing Big Sagebrush plant parts 0 to 23 inches; brown gravelly & very gravelly sandy loam; massive; soft; pH 7.0	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5	23 to 60 inches; brown & yellowish brown gravelly & very gravelly heavy sandy loam; massive; soft; pH 6.5	—
Substratum	24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; soft; pH 5.5	—	—

Soil Properties

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (2.0 inches)	Moderate (4.7 inches)	—
Water Retention Class	3 (0.8 inches)	2 (1.8 inches)	—
Hydrologic Soil Group	A	B	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—
Drainage Class	Somewhat Excessively	Well	—
Max Erosion Hazard	Low to High	Low	—
Erosion Factor (k)	0.10	0.24	—
Soil Productivity	Low to Moderate	Moderate	—
Soil Manageability Group	IV	II	—
Class	4EPgx	2p	—
Annual Forage Production (lb/acre)	200 to 800	300 to 500	—
Forest Survey Site Class	6-7	6-7	—

Included Areas & Remarks

Included in this map unit are small areas of Aquic Cryoborolls, 2 to 30 percent slopes, on margins of lakes; Lithic Cryorthents, 2 to 50 percent slopes, on moraine sideslopes, near rock outcroppings; & Rubbleland. Included areas make up approximately 20 percent of the map unit area.

213 - Stecum family - Rubbleland complex, 15 to 60 percent slopes

Elevation: 9,000 to 10,000 feet

Annual Precipitation: 20 to 30 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Stecum family

50 percent

Lateral & Terminal Moraines

15 to 60 percent

Lodgepole Pine & Big Sagebrush

Rubbleland

20 percent

Lateral & Terminal Moraines

—

Barren

Soil Profile Description

Surface Layer

0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5

Rubbleland consists of areas of detached rock fragments (colluvium) which have accumulated on mountainsides & moraine sideslopes as talus. These areas support little or no vegetation & are subject to landslides.

Subsoil

9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5

—

Substratum

24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; soft; pH 5.5

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Very Low (2.0 inches)

—

Water Retention Class

3 (0.8 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low to High

—

Erosion Factor (k)

0.10

—

Soil Productivity

Low

—

Soil Manageability

Group

IV

—

Class

4EPgx

—

Annual Forage Production (lb/acre)

< 300

—

Forest Survey Site Class

7-NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Charcol family, 15 to 30 percent slopes, in riparian areas; a soil similar to Vitrandic Xerochrepts, but colder, & underlain by mixed parent material, 0 to 15 percent slopes, on high mountain passes; Lithic Cryorthents, on moraines, adjacent to rock outcroppings; & Rock outcrop, on exposed moraine ridges. Included areas make up approximately 30 percent of the map unit area.

215 - Glean family, 0 to 50 percent slopes

Elevation: 7,600 to 8,900 feet

Annual Precipitation: 10 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Glean family

80 percent

Moraine Sideslopes & Crests

0 to 50 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 1 inch; dark grayish brown extremely stony loamy sand; single grain; loose; pH 6.4

Subsoil

1 to 15 inches; brown very stony & very cobbly sandy loam; weak granular structure; soft; pH 6.7

Substratum

15 to 60 inches; brown very cobbly sandy loam; massive; soft; pH 6.9

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (4.4 inches)

Water Retention Class

2 (1.3 inches)

Hydrologic Soil Group

B

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Well

Max Erosion Hazard

Low to High

Erosion Factor (k)

0.05

Soil Productivity

Moderate

Soil Manageability

Group

III

Class

3Egpx

Annual Forage Production (lb/acre)

400 to 800

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Nanamkin family, around the base of the Sherwin Bowl; & a soil similar to the Nanamkin family, but with a loamy-skeletal surface texture, on rolling moraine ridges. Included areas make up approximately 20 percent of the map unit area.

216 - Railcity - Rock outcrop complex, 2 to 15 percent slopes

Elevation: 7,000 to 8,000 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Railcity family

70 percent

Moraine Basins

2 to 15 percent

Jeffrey Pine

Rock outcrop

20 percent

Lava Flows

—

Barren

Soil Profile Description

Surface Layer

1 to 0 inch; decomposing Jeffrey Pine needles & twigs, & Big Sagebrush leaves

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 14 inches; grayish brown & light grayish brown gravelly & extremely stony coarse sand; weak granular structure; soft; pH 5.5 to 6.5

Subsoil

—

—

Substratum

14 to 60 inches; light brownish gray & gray very cobbly & very stony coarse sand; massive; pH 6.5 to 7.0

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Very Low (1.7 inches)

—

Water Retention Class

3 (0.5 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Very Rapid (20+ in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low

—

Erosion Factor (k)

0.05

—

Soil Productivity

Very Low

—

Soil Manageability

Group

III

—

Class

4PX

—

Annual Forage Production (lb/acre)

< 200

—

Forest Survey Site Class

5-7

—

Included Areas & Remarks

Included in this map unit are small areas of Nanamkin family, at higher elevations; & a soil similar to the Powment family, but shallow to hard basalt bedrock, near rock outcrops. Included areas make up approximately 10 percent of the map unit area.

217 - Nanamkin family - Rubbleland complex, 60 to 80 percent slopes

Elevation: 7,800 to 9,400 feet

Annual Precipitation: 15 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Nanamkin family

60 percent

Mountainsides

60 to 80 percent

Mixed Conifer - Fir

Rubbleland

20 percent

Mountainsides

—

Barren

Soil Profile Description

Surface Layer

0 to 7 inches; brown very cobbly loamy sand; weak subangular blocky structure; soft; pH 7.0

Rubbleland consists of areas of detached rock fragments (colluvium) which have accumulated on mountainsides & moraine sideslopes as talus. These areas support little or no vegetation & are subject to landslides.

Subsoil

—

—

Substratum

7 to 60 inches; yellowish brown very cobbly loamy sand; massive; soft; pH 7.0

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Very Low (2.3 inches)

—

Water Retention Class

3 (0.8 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

High to Very High

—

Erosion Factor (k)

0.05

—

Soil Productivity

Low

—

Soil Manageability

Group

IV

—

Class

4GEPX

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

6-7

—

Included Areas & Remarks

Included in this map unit are small areas of Rock outcrop, on mountain ridges; a soil similar to the Glean family, but high in lime, & a soil similar to the Mascamp family, but high in lime. Included areas make up approximately 20 percent of the map unit area.

218 - Rock outcrop - Railcity family association, 30 to 90 percent slopes

Elevation: 7,800 to 9,400 feet

Annual Precipitation: 15 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Rock outcrop

40 percent

Ridges & Bluffs

—

Barren

Railcity family

35 percent

Mountainsides

30 to 90 percent

Mountain Mahogany

Soil Profile Description

Surface Layer

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

1 to 0 inch; decomposing Jeffrey Pine needles & twigs, & Big Sagebrush leaves

0 to 14 inches; grayish brown & light brownish gray gravelly & extremely stony coarse sand; weak granular structure; soft; pH 5.5 to 6.5

Subsoil

—

—

Substratum

—

14 to 60 inches; light brownish gray & gray very cobbly & very stony coarse sand; massive; pH 6.5 to 7.0

Soil Properties

Restrictive Layer Depth

—

Greater than 60 inches

Effective Rooting Depth
(inches)

—

Very Deep (> 60 inches)

Available Water Capacity

—

Very Low (1.7 inches)

Water Retention Class

—

3 (0.5 inches)

Hydrologic Soil Group

—

A

Permeability (in./hr.)

—

Very Rapid (20+ in./hr.)

Drainage Class

—

Somewhat Excessively

Max Erosion Hazard

—

Moderate to Very High

Erosion Factor (k)

—

0.05

Soil Productivity

—

Very Low

Soil Manageability

Group

—

IV

Class

—

4GEPX

Annual Forage Production
(lb/acre)

—

< 200

Forest Survey Site Class

—

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Powment family, but shallow to hard bedrock, on mountainsides, near rock outcroppings; a soil similar to the Chesaw family, but less than 40 inches to bedrock & effervescent throughout, on mountainsides, near calcareous rock outcroppings. Included areas make up approximately 25 percent of the map unit area.

301 - Neuske family, 15 to 30 percent slopes

Elevation: 6,400 to 9,400 feet

Annual Precipitation: 6 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Nueske family

75 percent

Mountainsides

15 to 30 percent

Quaking Aspen

Soil Profile Description

Surface Layer

0 to 2 inches; brown gravelly fine sandy loam;
weak granular structure; soft; pH 6.2

Subsoil

2 to 20 inches; brown gravelly loam & light
yellowish brown clay loam; weak & moderate
subangular blocky structure; soft, slightly hard;
pH 6.5

Substratum

20 to 44 inches; light yellowish brown very cobbly
loam; massive; slightly hard; pH 6.5

44 inches; soft weathered granitic and
metasedimentary bedrock

Soil Properties

Restrictive Layer Depth

44 inches (PC)

Effective Rooting Depth
(inches)

Deep (40 to 60 inches)

Available Water Capacity

Moderate (5.7 inches)

Water Retention Class

1 (3.2 inches)

Hydrologic Soil Group

B-C

Permeability (in./hr.)

Mod. Slow (0.2 to 0.6 in./hr.)

Drainage Class

Well

Max Erosion Hazard

Low to Moderate

Erosion Factor (k)

0.32

Soil Productivity

Moderate

Soil Manageability

Group

II

Class

2e

Annual Forage Production
(lb/acre)

400 to 800

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Cryopsamments, Vitrandic Xeropsamments & the Fez family. Included areas make up approximately 25 percent of the map unit area.

302 - Rock outcrop - Abgese - Pass Canyon families complex, 15 to 30 percent slopes

Elevation: 8,200 to 8,900 feet

Annual Precipitation: 15 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Rock outcrop, granitic

40 percent

Mountainsides & Ridges

—

Barren

Abgese family

25 percent

Mountainsides

15 to 30 percent

Pinyon Pine

Pass Canyon family

20 percent

Mountainsides

15 to 30 percent

Pinyon Pine

Soil Profile Description

Surface Layer

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 7 inches; grayish brown cobbly coarse sand & loamy coarse sand; weak granular & subangular blocky structure; soft; pH 6.5

0 to 5 inches; brown very cobbly & gravelly loamy sand; weak subangular blocky structure; soft; pH 6.2

Subsoil

—

7 to 10 inches; brown gravelly loamy sand; weak subangular blocky structure; soft; pH 6.8

5 to 13 inches; grayish brown sandy loam; moderate subangular blocky structure; hard; pH 6.7

Substratum

—

10 to 26 inches; yellowish brown very gravelly sandy clay loam; moderate subangular blocky structure; slightly hard to hard; pH 6.6

13 inches; hard granitic bedrock

26 inches; soft weathered granitic bedrock

Soil Properties

Restrictive Layer Depth

—

20 to 40 inches (FB)

13 to 19 inches (HB)

Effective Rooting Depth (inches)

—

Mod. Deep (20 to 40 inches)

Shallow (10 to 20 inches)

Available Water Capacity

—

Low (2.3 inches)

Very Low (1.2 inches)

Water Retention Class

—

2 (1.7 inches)

3 (1.2 inches)

Hydrologic Soil Group

—

C

C-D

Permeability (in./hr.)

—

Mod. Slow (0.2 to 0.6 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

—

Well

Well

Max Erosion Hazard

—

Low to Moderate

Low to Moderate

Erosion Factor (k)

—

0.10

0.05

Soil Productivity

—

Low

Low

Soil Manageability

Group

—

III

IV

Class

—

3Xep

4PXed

Annual Forage Production (lb/acre)

—

300 to 600

< 300

Forest Survey Site Class

—

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Jaybee family & areas make up approximately 15 percent of the map unit area.

303 - Rock outcrop - Abgese - Pass Canyon families complex, 30 to 60 percent slopes

Elevation: 7,000 to 8,900 feet

Annual Precipitation: 10 to 20 inches

Soil Map Unit Components	Rock outcrop, granitic	Abgese family	Pass Canyon family
Approx Proportion	40 percent	25 percent	20 percent
Landscape Position	Mountainsides & Ridges	Mountainsides	Mountainsides
Slope	—	30 to 60 percent	30 to 60 percent
Typical Vegetation	Barren	Pinyon Pine	Pinyon Pine

Soil Profile Description

Surface Layer	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.	0 to 7 inches; grayish brown cobbly coarse sand & loamy coarse sand; weak granular & subangular blocky structure; soft; pH 6.5	0 to 5 inches; brown very cobbly & gravelly loamy sand; weak subangular blocky structure; soft; pH 6.2
Subsoil	—	7 to 10 inches; brown gravelly loamy sand; weak subangular blocky structure; soft; pH 6.8	5 to 13 inches; grayish brown sandy loam; moderate subangular blocky structure; hard; pH 6.7
Substratum	—	10 to 26 inches; yellowish brown very gravelly sandy clay loam; moderate subangular blocky structure; slightly hard to hard; pH 6.6 26 inches; soft weathered granitic bedrock	13 inches; hard granitic bedrock

Soil Properties

Restrictive Layer Depth	—	20 to 40 inches (FB)	13 to 19 inches (HB)
Effective Rooting Depth (inches)	—	Mod. Deep (20 to 40 inches)	Shallow (10 to 20 inches)
Available Water Capacity	—	Low (2.3 inches)	Very Low (1.2 inches)
Water Retention Class	—	2 (1.7 inches)	3 (1.2 inches)
Hydrologic Soil Group	—	C	C-D
Permeability (in./hr.)	—	Mod. Slow (0.2 to 0.6 in./hr.)	Mod. Rapid (2 to 6 in./hr.)
Drainage Class	—	Well	Well
Max Erosion Hazard	—	Moderate to High	Moderate to High
Erosion Factor (k)	—	0.10	0.05
Soil Productivity	—	Low	Low
Soil Manageability			
Group	—	IV	IV
Class	—	4EXgp	4EPXgd
Annual Forage Production (lb/acre)	—	300 to 600	< 300
Forest Survey Site Class	—	NC	NC

Included Areas & Remarks

Included in this map unit are small areas of the Jaybee family & areas make up approximately 15 percent of the map unit area.

304 - Rock outcrop - Abgese - Pass Canyon families complex, 60 to 90 percent slopes

Elevation: 6,600 to 9,600 feet

Annual Precipitation: 5 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Rock outcrop, granitic

40 percent

Mountainsides & Ridges

—

Barren

Abgese family

25 percent

Mountainsides

60 to 90 percent

Pinyon Pine

Pass Canyon family

20 percent

Mountainsides

60 to 90 percent

Pinyon Pine

Soil Profile Description

Surface Layer

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 7 inches; grayish brown cobbly coarse sand & loamy coarse sand; weak granular & subangular blocky structure; soft; pH 6.5

0 to 5 inches; brown very cobbly & gravelly loamy sand; weak subangular blocky structure; soft; pH 6.2

Subsoil

—

7 to 10 inches; brown gravelly loamy sand; weak subangular blocky structure; soft; pH 6.8

5 to 13 inches; grayish brown sandy loam; moderate subangular blocky structure; hard; pH 6.7

Substratum

—

10 to 26 inches; yellowish brown very gravelly sandy clay loam; moderate subangular blocky structure; slightly hard to hard; pH 6.6

13 inches; hard granitic bedrock

26 inches; soft weathered granitic bedrock

Soil Properties

Restrictive Layer Depth

—

20 to 40 inches (FB)

13 to 19 inches (HB)

Effective Rooting Depth (inches)

—

Mod. Deep (20 to 40 inches)

Shallow (10 to 20 inches)

Available Water Capacity

—

Low (2.3 inches)

Very Low (1.2 inches)

Water Retention Class

—

2 (1.7 inches)

3 (1.2 inches)

Hydrologic Soil Group

—

C

C-D

Permeability (in./hr.)

—

Mod. Slow (0.2 to 0.6 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

—

Well

Well

Max Erosion Hazard

—

High to Very High

High to Very High

Erosion Factor (k)

—

0.10

0.05

Soil Productivity

—

Low

Low

Soil Manageability

—

IV

IV

Group

—

4GEXp

4GEPXd

Class

—

Annual Forage Production (lb/acre)

—

300 to 600

< 300

Forest Survey Site Class

—

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Jaybee family & areas make up approximately 15 percent of the map unit area.

305 - Delaney family - Rock outcrop complex, 0 to 30 percent slopes

Elevation: 7,000 to 8,300 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Delaney family

50 percent

Sideslopes of Alluvial Fans

0 to 30 percent

Pinyon Pine

Rock outcrop, rhyolitic

25 percent

Tops & Sideslopes of Alluvial Fans

—

Barren

Soil Profile Description

Surface Layer

0 to 10 inches; light brownish gray gravelly loamy sand; weak very fine granular structure; soft; pH 6.4

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

10 to 23 inches; brown loamy sand & gravelly loamy sand; massive; slightly hard; pH 6.4

—

23 inches; hard rhyolitic bedrock

Soil Properties

Restrictive Layer Depth

23 inches (HB)

—

Effective Rooting Depth (inches)

Mod. Deep (20 to 40 inches)

—

Available Water Capacity

Very Low (1.4 inches)

—

Water Retention Class

3 (1.2 inches)

—

Hydrologic Soil Group

B-C

—

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.15

—

Soil Productivity

Low

—

Soil Manageability

Group

III

—

Class

4PXed

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Atter family, but dominated by pyroclastic rock fragments, 0 to 15 percent slopes, on fan tops, depressions & sideslopes; the Preston family, on fan sideslopes & the Atter family, 0 to 15 percent slopes, on fan tops & sideslopes. Included areas make up approximately 25 percent of the map unit area.

306 - Delaney family - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 6,900 to 8,400 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Delaney family

50 percent

Sideslopes of Alluvial Fans

30 to 60 percent

Pinyon Pine

Rock outcrop, rhyolitic

25 percent

Tops & Sideslopes of Alluvial Fans

—

Barren

Soil Profile Description

Surface Layer

0 to 10 inches; light brownish gray gravelly loamy sand; weak very fine granular structure; soft; pH 6.4

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

10 to 23 inches; brown loamy sand & gravelly loamy sand; massive; slightly hard; pH 6.4

—

23 inches; hard rhyolitic bedrock

Soil Properties

Restrictive Layer Depth

23 inches (HB)

—

Effective Rooting Depth (inches)

Mod. Deep (20 to 40 inches)

—

Available Water Capacity

Very Low (1.4 inches)

—

Water Retention Class

3 (1.2 inches)

—

Hydrologic Soil Group

B-C

—

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Moderate to High

—

Erosion Factor (k)

0.15

—

Soil Productivity

Low

—

Soil Manageability

Group

IV

—

Class

4EPXgd

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Atter family, but dominated by pyroclastic rock fragments, on fan tops, depressions & sideslopes; the Preston family, on fan sideslopes & the Atter family, on fan tops & sideslopes. Included areas make up approximately 25 percent of the map unit area.

307 - Vitrandic Xeropsamments, warm, 15 to 30 percent slopes

Elevation: 7,000 to 8,300 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Xeropsamments, warm

75 percent

Hillsides

15 to 30 percent

Big Sagebrush & Bitterbrush

Soil Profile Description

Surface Layer

0 to 1 inch; grayish brown loamy fine sand;
massive; soft; pH 6.0

Subsoil

—

Substratum

1 to 60 inches; light brownish gray & light gray
very gravelly & gravelly coarse sand; massive;
soft; pH 6.5

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth
(inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.7 inches)

Water Retention Class

2 (1.3 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Erosion Factor (k)

0.20

Soil Productivity

Very Low

Soil Manageability

Group

II

Class

2ep

Annual Forage Production
(lb/acre)

< 200

Forest Survey Site Class

5-6

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Haploxerolls, & Vitrandic Xerorthents, ashy, warm and Vitrandic Xerorthents, warm. Included areas make up approximately 25 percent of the map unit area.

308 - Vitrandic Xerorthents - Vitrandic Xerorthents, ashy complex 30 to 60 percent slopes

Elevation: 7,900 to 10,000 feet

Annual Precipitation: 15 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Xerorthents

40 percent

Mountainsides

30 to 60 percent

Lodgepole & Jeffrey Pine

Vitrandic Xerorthents, ashy

35 percent

Mountainsides

30 to 60 percent

Jeffrey & Lodgepole Pine

Soil Profile Description

Surface Layer

1 to 0 inches; decomposing Lodgepole and Jeffrey Pine needles, twigs & small branches

1 to 0 inches; decomposing Jeffrey and Lodgepole Pine needles, twigs & small branches

0 to 4 inches; brown & pinkish gray extremely gravelly loamy sand; massive; soft; pH 5.5

0 to 4 inches; brown gravelly loamy sand; massive; soft; pH 6.0

Subsoil

—

4 to 23 inches; pale brown gravelly loamy sand & loamy sand massive; soft; pH 5.6 to 5.9

Substratum

4 to 60 inches; very pale brown & brown extremely gravelly coarse sand; single grain; loose; pH 5.0 to 6.0

23 to 60 inches; pale brown & pinkish gray very gravelly loamy sand & loamy sand; massive; soft; pH 5.1 to 5.9

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Deep (40 to 60 inches)

Available Water Capacity

Very Low (0.8 inches)

Moderate (5.5 inches)

Water Retention Class

3 (0.3 inches)

2 (1.7 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Moderate to High

Erosion Factor (k)

0.10

0.10

Soil Productivity

Very Low

Low

Soil Manageability

Group

III

III

Class

3Pgex

2gepx

Annual Forage Production (lb/acre)

< 200

200 to 400

Forest Survey Site Class

5-7

5

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xerorthents, pumiceous, Vitrandic Haplo- xerolls, & Rock outcrop; & Vitrandic Torriorthents, ashy, adjacent to canyon walls. Included areas make up approximately 25 percent of the map unit area.

309 - Vitrandic Xeropsamments, 15 to 30 percent slopes

Elevation: 7,000 to 8,500 feet

Annual Precipitation: 15 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Xeropsamments

75 percent

Mountainsides

15 to 30 percent

Lodgepole & Jeffrey Pine

Soil Profile Description

Surface Layer

2 to 0 inches; decomposing Lodgepole and Jeffrey Pine needles and twigs

0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 5.6

Subsoil

—

Substratum

7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (4.4 inches)

Water Retention Class

2 (1.4 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Erosion Factor (k)

0.15

Soil Productivity

Low

Soil Manageability

Group

II

Class

2ep

Annual Forage Production (lb/acre)

200 to 400

Forest Survey Site Class

4-6

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Haploxerolls, on mountainsides; Vitrandic Xerorthents, ash; Vitrandic Xerorthents, cold; & Vitrandic Torriorthents, ash, adjacent to canyon walls. Included areas make up approximately 25 percent of the map unit area.

310 - Brantel family, 30 to 60 percent slopes

Elevation: 7,000 to 8,500 feet

Annual Precipitation: 10 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Brantel family

75 percent

Bench Terraces

30 to 60 percent

Big Sagebrush & Bitterbrush

Soil Profile Description

Surface Layer

0 to 9 inches; light brownish gray and light gray coarse sand & gravelly loamy coarse sand; massive; soft; pH 5.0

Subsoil

—

Substratum

9 to 60 inches; white, light gray, dark gray & black gravelly coarse sand & loamy coarse sand & gravel; massive; soft; pH 5.5 to 7.2

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Deep (40 to 60 inches)

Available Water Capacity

Low (2.4 inches)

Water Retention Class

3 (0.9 inches)

Hydrologic Soil Group

B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Erosion Factor (k)

0.10

Soil Productivity

Low

Soil Manageability

Group

IV

Class

4EPg

Annual Forage Production (lb/acre)

200 to 400

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of rock outcrop, on terraces; Vitrandic Xeropsamments, warm, at higher elevations, on bench terraces; Vitrandic Haplxerolls & Vitrandic Torriorthents, ashy, adjacent to canyon walls. Included areas make up approximately 25 percent of the map unit area.

311 - Vitrandic Xeropsamments - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 8,300 to 9,900 feet

Annual Precipitation: 15 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Xeropsamments

50 percent

Mountainsides

15 to 30 percent

Lodgepole & Jeffrey Pine

Rock outcrop, rhyolitic

25 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

2 to 0 inches; decomposing Lodgepole and Jeffrey Pine needles and twigs

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 5.6

Subsoil

—

—

Substratum

7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Moderate (4.4 inches)

—

Water Retention Class

2 (1.4 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.15

—

Soil Productivity

Low

—

Soil Manageability

Group

III

—

Class

3Xep

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

5-7

—

Included Areas & Remarks

Included in this map unit are small areas of the Fez family, Vitrandic Xerorthents, Vitrandic Xerorthents, ashy & Vitrandic Xerorthents, pumiceous. Included areas make up approximately 25 percent of the map unit area.

312 - Wrango - Atter families complex, 30 to 60 percent slopes

Elevation: 5,900 to 10,200 feet

Annual Precipitation: 8 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Wrango family

50 percent

Mountainsides & Canyon Slopes

30 to 60 percent

Big Sagebrush & Rabbitbrush

Atter family

35 percent

Mountainsides & Canyon Slopes

30 to 60 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 15 inches; grayish brown loamy coarse sand, single grain; loose; pH 6.8

0 to 2 inches; brown extremely stony sandy loam; single grain; loose; pH 6.4

Subsoil

—

—

Substratum

15 to 60 inches; light brown very cobbly coarse sand; massive; slightly hard; pH 6.8

2 to 44 inches; pale red extremely stony loamy sand; strong subangular blocky structure; loose to hard; pH 6.5

44 inches; granitic glacial till

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

44 inches (PC)

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Deep (40 to 60 inches)

Available Water Capacity

Very Low (1.9 inches)

Very Low (0.6 inches)

Water Retention Class

3 (1.1 inches)

3 (0.3 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Moderate to High

Erosion Factor (k)

0.15

0.10

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

IV

IV

Class

4EPg

4EPgx

Annual Forage Production (lb/acre)

300 to 500

200 to 400

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Nanamkin family, at higher elevations & the Sur family, on canyon slopes and mountainsides. Included areas make up approximately 15 percent of the map unit area.

313 - Wrango - Atter families complex, 60 to 90 percent slopes

Elevation: 6,000 to 10,200 feet

Annual Precipitation: 8 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Wrango family

50 percent

Mountainsides & Canyon Slopes

60 to 90 percent

Big Sagebrush & Rabbitbrush

Atter family

35 percent

Mountainsides & Canyon Slopes

60 to 90 percent

Big Sagebrush & Pinyon Pine

Soil Profile Description

Surface Layer

0 to 15 inches; grayish brown loamy coarse sand, single grain; loose; pH 6.8

0 to 2 inches; brown extremely stony sandy loam; single grain; loose; pH 6.4

Subsoil

—

—

Substratum

15 to 60 inches; light brown very cobbly coarse sand; massive; slightly hard; pH 6.8

2 to 44 inches; pale red extremely stony loamy sand; strong subangular blocky structure; loose to hard; pH 6.5

44 inches; granitic glacial till

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

44 inches (PC)

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Deep (40 to 60 inches)

Available Water Capacity

Very Low (1.9 inches)

Very Low (0.6 inches)

Water Retention Class

3 (1.1 inches)

3 (0.6 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

High to Very High

High to Very High

Erosion Factor (k)

0.15

0.10

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

IV

IV

Class

4EGPx

4EGPX

Annual Forage Production (lb/acre)

300 to 500

200 to 400

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Nanamkin family, at higher elevations & the Sur family, on canyon slopes and mountainsides, with rock outcrops on ridges. Included areas make up approximately 15 percent of the map unit area.

314 - Rock outcrop - Vitrandic Torriorthents, gravelly complex, 30 to 60 percent slopes

Elevation: 7,000 to 8,000 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Rock outcrop, rhyolitic

60 percent

Steep Canyon Walls

—

Barren

Vitrandic Torriorthents, gravelly

25 percent

Steep Canyon Walls

30 to 60 percent

Big Sagebrush & Rabbitbrush

Soil Profile Description

Surface Layer

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants

0 to 4 inches; pale brown very gravelly loamy sand; weak granular structure; soft; pH 6.4

Subsoil

—

—

Substratum

—

4 to 60 inches; pale brown & light gray cobbly, very cobbly & very gravelly loamy sand; massive; soft; pH 6.4

Soil Properties

Restrictive Layer Depth

—

Greater than 60 inches

Effective Rooting Depth (inches)

—

Very deep (> 60 inches)

Available Water Capacity

—

Moderate (4.1 inches)

Water Retention Class

—

2 (1.3 inches)

Hydrologic Soil Group

—

A

Permeability (in./hr.)

—

Rapid (6 to 20 in./hr.)

Drainage Class

—

Somewhat Excessively

Max Erosion Hazard

—

Moderate to High

Erosion Factor (k)

—

0.15

Soil Productivity

—

Low to Moderate

Soil Manageability

Group

—

IV

Class

—

4EXgp

Annual Forage Production (lb/acre)

—

300 to 600

Forest Survey Site Class

—

NC

Included Areas & Remarks

Included in this map unit are small areas of the Brantel & Wrango families, on steep canyon walls. Included areas make up approximately 15 percent of the map unit area.

315 - Brantel family - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 6,500 to 8,600 feet

Annual Precipitation: 5 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Brantel family

45 percent

Hillsides

30 to 60 percent

Big Sagebrush & Pinyon Pine

Rock outcrop, rhyolitic

40 percent

Hillsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 9 inches; light brownish gray and light gray coarse sand & gravelly loamy coarse sand; massive; soft; pH 5.0

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

9 to 60 inches; white, light gray, dark gray & black gravelly coarse sand & loamy coarse sand & gravel; massive; soft; pH 5.5 to 7.2

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Deep (40 to 60 inches)

—

Available Water Capacity

Low (2.4 inches)

—

Water Retention Class

3 (0.9 inches)

—

Hydrologic Soil Group

B

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Moderate to High

—

Erosion Factor (k)

0.10

—

Soil Productivity

Low

—

Soil Manageability

Group

IV

—

Class

4EPXg

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Berent & Yellowhills families, on hillsides. Included areas make up approximately 15 percent of the map unit area.

**316 - Delaney family - Rock outcrop - Vitrandic Torriorthents, ashy complex,
0 to 30 percent slopes**

Elevation: 5,800 to 7,600 feet

Annual Precipitation: 6 to 12 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Delaney family

50 percent

Sideslopes of Alluvial Fans

0 to 30 percent

Big Sagebrush & Jeffrey Pine

**Rock outcrop,
rhyolitic**

20 percent

Tops & Sideslopes of Alluvial
Fans

—

Barren

**Vitrandic
Torriorthents, ashy**

15 percent

Sideslopes of Alluvial Fans

0 to 30 percent

Big Sagebrush & Jeffrey Pine

Soil Profile Description

Surface Layer

0 to 10 inches; light brownish gray
gravelly loamy sand; weak very
fine granular structure; soft; pH 6.4

Rock outcrop consists of
continuous bare bedrock & less
than 15 percent inclusions of soil
material capable of supporting
plants.

0 to 12 inches; light gray & pale
yellow sand; single grain &
massive; loose & slightly hard; pH
8.0

Subsoil

—

—

—

Substratum

10 to 23 inches; brown loamy sand
& gravelly loamy sand; massive;
slightly hard; pH 6.4

—

12 to 60 inches; light gray &
grayish brown stratified silt loam,
fine sandy loam, sand, gravel sand
& coarse sand; massive; slightly
hard; pH 8.0 to 8.5

23 inches; hard rhyolitic bedrock

Soil Properties

Restrictive Layer Depth

23 inches (HB)

—

Greater than 60 inches

Effective Rooting Depth
(inches)

Mod. Deep (20 to 40 inches)

—

Very Deep (> 60 inches)

Available Water Capacity

Very Low (1.4 inches)

—

Moderate (4.3 inches)

Water Retention Class

3 (1.2 inches)

—

2 (1.8 inches)

Hydrologic Soil Group

B-C

—

A-B

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

—

Moderate (0.6 to 2 in./hr.)

Drainage Class

Somewhat Excessively

—

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

—

Low to Moderate

Erosion Factor (k)

0.15

—

0.15

Soil Productivity

Low

—

Low

Soil Manageability

Group

III

—

III

Class

4PXed

—

3Xep

Annual Forage Production
(lb/acre)

200 to 400

—

200 to 400

Forest Survey Site Class

7-NC

—

6-NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Fez family, but shallow to bedrock, adjacent to rock outcroppings; and a soil similar to the Brantel family, but shallow to a paralithic contact, on alluvial fans. Included areas make up approximately 15 percent of the map unit area.

317 - Vitrandic Torriorthents, gravelly - Brantel family complex, 2 to 30 percent slopes

Elevation: 7,000 to 9,300 feet

Annual Precipitation: 10 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Torriorthents, gravelly

40 percent

Hillsides

2 to 30 percent

Big Sagebrush & Rabbitbrush

Brantel family

35 percent

Dissected Alluvial Fans

2 to 30 percent

Big Sagebrush & Rabbitbrush

Soil Profile Description

Surface Layer

0 to 4 inches; pale brown very gravelly loamy sand; weak granular structure; soft; pH 6.4

0 to 9 inches; light brownish gray and light gray coarse sand & gravelly loamy coarse sand; massive; soft; pH 5.0

Subsoil

—

—

Substratum

4 to 60 inches; pale brown & light gray cobbly, very cobbly & very gravelly loamy sand; massive; soft; pH 6.4

9 to 60 inches; white, light gray, dark gray & black gravelly coarse sand & loamy coarse sand & gravel; massive; soft; pH 5.5 7.2

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Deep (40 to 60 inches)

Available Water Capacity

Moderate (4.1 inches)

Low (2.4 inches)

Water Retention Class

2 (1.3 inches)

3 (0.9 inches)

Hydrologic Soil Group

A

B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.15

0.10

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

II

III

Class

2ep

3Pe

Annual Forage Production (lb/acre)

300 to 600

200 to 400

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Delaney, Lakash, Berent & Wrango families. Included areas make up approximately 25 percent of the map unit area.

318 - Fez family, 2 to 15 percent slopes

Elevation: 8,400 to 8,600 feet

Annual Precipitation: 15 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Fez family

75 percent

Drainages and Depressions

2 to 15 percent

Aspen and Lodgepole Pine

Soil Profile Description

Surface Layer

1 to 0 inches; decomposing Aspen leaves & twigs

0 to 10 inches; grayish brown & brown sand;
massive; soft; pH 6.0

Subsoil

—

Substratum

10 to 60 inches; brown & light yellowish brown
sand; massive; soft; pH 6.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth
(inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.4 inches)

Water Retention Class

2 (1.9 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low

Erosion Factor (k)

0.14

Soil Productivity

Low to Moderate

Soil Manageability

Group

II

Class

2p

Annual Forage Production
(lb/acre)

400 to 800

Forest Survey Site Class

5-7

Included Areas & Remarks

Included in this map unit are small areas of the Haypress family, on gentle mountainsides; Vitrandic Xerorthents, ashy, and Vitrandic Xerorthents, pumiceous, on the fringe of depressions. Included areas make up approximately 25 percent of the map unit area.

319 - Waterman - Sur families - Rock outcrop complex, 15 to 30 percent slopes

Elevation: 5,800 to 7,000 feet

Annual Precipitation: 6 to 10 inches

Soil Map Unit Components	Waterman family	Sur family	Rock outcrop, granitic
Approx Proportion	30 percent	30 percent	15 percent
Landscape Position	Hillsides	Hillsides	Hillsides & Ridges
Slope	15 to 30 percent	15 to 30 percent	—
Typical Vegetation	Pinyon Pine & Big Sagebrush	Pinyon Pine & Big Sagebrush	Barren

Soil Profile Description

Surface Layer	0 to 3 inches; brown extremely bouldery loamy sand; weak granular structure; soft; pH 6.6	0 to 12 inches; brown gravelly loamy sand & very cobbly sandy loam; weak & moderate subangular blocky structure; soft; pH 6.7	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	—	—
Substratum	3 to 12 inches; pale brown extremely bouldery loamy sand & sand; moderate subangular blocky & massive structure; slightly hard; pH 6.6	12 to 60 inches; pale brown very cobbly & very gravelly sandy loam; massive; very hard; pH 6.7	—
	12 inches; hard adamellite bedrock		

Soil Properties

Restrictive Layer Depth	7 to 20 inches (HB)	Greater than 60 inches	—
Effective Rooting Depth (inches)	Shallow (10 to 20 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (0.2 inches)	Low (3.3 inches)	—
Water Retention Class	3 (0.2 inches)	2 (1.3 inches)	—
Hydrologic Soil Group	C-D	B	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—
Drainage Class	Somewhat Excessively	Well	—
Max Erosion Hazard	Low to Moderate	Low to Moderate	—
Erosion Factor (k)	0.05	0.10	—
Soil Productivity	Very Low	Low to Moderate	—
Soil Manageability			
Group	IV	II	—
Class	4PXe	2epx	—
Annual Forage Production (lb/acre)	< 300	300 to 500	—
Forest Survey Site Class	NC	NC	—

Included Areas & Remarks

Included in this map unit are small areas of the Wrango & Delaney families, and Torriorthentic Haploxerolls, on hillsides. Included areas make up approximately 25 percent of the map unit area.

320 - Waterman - Sur families - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 4,400 to 8,600 feet

Annual Precipitation: 4 to 17 inches

Soil Map Unit Components	Waterman family	Sur family	Rock outcrop, granitic
Approx Proportion	30 percent	30 percent	15 percent
Landscape Position	Hillsides & Moraines	Hillsides & Moraines	Hillsides, Ridges & Moraines
Slope	30 to 60 percent	30 to 60 percent	—
Typical Vegetation	Pinyon Pine & Big Sagebrush	Pinyon Pine & Big Sagebrush	Barren

Soil Profile Description

Surface Layer	0 to 3 inches; brown extremely bouldery loamy sand; weak granular structure; soft; pH 6.6	0 to 12 inches; brown gravelly loamy sand & very cobbly sandy loam; weak & moderate subangular blocky structure; soft; pH 6.7	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	—	—
Substratum	3 to 12 inches; pale brown extremely bouldery loamy sand & sand; moderate subangular blocky & massive structure; slightly hard; pH 6.6	12 to 60 inches; pale brown very cobbly & very gravelly sandy loam; massive; very hard; pH 6.7	—
	12 inches; hard adamellite bedrock		

Soil Properties

Restrictive Layer Depth	7 to 20 inches (HB)	Greater than 60 inches	—
Effective Rooting Depth (inches)	Shallow (10 to 20 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (0.2 inches)	Low (3.3 inches)	—
Water Retention Class	3 (0.2 inches)	2 (1.3 inches)	—
Hydrologic Soil Group	C-D	B	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—
Drainage Class	Somewhat Excessively	Well	—
Max Erosion Hazard	Moderate to High	Moderate to High	—
Erosion Factor (k)	0.05	0.10	—
Soil Productivity	Very Low	Low to Moderate	—
Soil Manageability			
Group	IV	III	—
Class	4EPXg	3Egpx	—
Annual Forage Production (lb/acre)	< 300	300 to 500	—
Forest Survey Site Class	NC	NC	—

Included Areas & Remarks

Included in this map unit are small areas of the Wrango, Atter families & Torriorthentic Haploxerolls, on hillsides. Included areas make up approximately 25 percent of the map unit area.

321 - Yellowhills family, 2 to 15 percent slopes

Elevation: 6,000 to 8,400 feet

Annual Precipitation: 8 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Yellowhills family

80 percent

Alluvial Fans & Depressions

2 to 15 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 5 inches; grayish brown gravelly coarse sand & sand; single grain & massive; loose & soft; pH 6.0

Subsoil

—

Substratum

5 to 60 inches; brown & yellowish brown loamy sand; massive; soft; pH 6.5 to 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth
(inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.1 inches)

Water Retention Class

2 (1.6 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low

Erosion Factor (k)

0.10

Soil Productivity

Low to Moderate

Soil Manageability

Group

II

Class

2p

Annual Forage Production
(lb/acre)

300 to 600

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Delaney, Brantel & Lakash families. Included areas make up approximately 20 percent of the map unit area.

322 - Berent family, 15 to 30 percent slopes

Elevation: 4,400 to 6,000 feet

Annual Precipitation: 4 to 8 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Berent family

75 percent

Sideslopes of Cinder Cones

15 to 30 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 4 inches; light yellowish brown loamy sand;
weak granular structure; soft; pH 7.4

Subsoil

—

Substratum

4 to 60 inches; light yellowish brown loamy sand &
sand; massive; soft; pH 7.2

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth
(inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.9 inches)

Water Retention Class

3 (1.1 inches)

Hydrologic Soil Group

A-B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Erosion Factor (k)

0.15

Soil Productivity

Low

Soil Manageability

Group

III

Class

3Pe

Annual Forage Production
(lb/acre)

200 to 400

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Haypress, Kiona & Preston families. Included areas make up approximately 25 percent of the map unit area.

323 - Nanamkin - Bearskin families association, 0 to 30 percent slopes.

Elevation: 8,400 to 9,300 feet

Annual Precipitation: 15 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Nanamkin family

50 percent

Hillsides

0 to 30 percent

Big Sagebrush

Bearskin family

30 percent

Hilltops

0 to 30 percent

Mountain Mahogany

Soil Profile Description

Surface Layer

0 to 7 inches; brown very cobbly loamy sand; weak subangular blocky structure; soft; pH 7.0

0 to 2 inches; brown gravelly loamy fine sand; weak granular structure; soft; pH 6.4

Subsoil

—

2 to 10 inches; grayish brown & brown gravelly sandy loam; moderate subangular blocky structure; slightly hard; pH 6.5

Substratum

7 to 60 inches; yellowish brown vey cobbly loamy sand; massive; soft; pH 7.0

10 inches; hard granitic, Metasedimentary and basalt bedrock

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

10 to 20 inches (HB)

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Shallow (10 to 20 inches)

Available Water Capacity

Very Low (2.3 inches)

Very Low (0.8 inches)

Water Retention Class

3 (0.8 inches)

3 (0.8 inches)

Hydrologic Soil Group

A

C-D

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Somewhat Excessively

Well

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.05

0.17

Soil Productivity

Low

Low to Moderate

Soil Manageability

Group

III

IV

Class

3Pe

4PXed

Annual Forage Production (lb/acre)

200 to 400

300 to 600

Forest Survey Site Class

6-7

NC

Included Areas & Remarks

Included in this map unit are small areas of the Abgese & Pass Canyon families, on hilltops; the Fez family, on hillsides. Included areas make up approximately 20 percent of the map unit area.

324 - Fez family - Vitrandic Xeropsamments complex, 0 to 30 percent slopes

Elevation: 8,200 to 9,800 feet

Annual Precipitation: 15 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Fez family

50 percent

Mountainsides & Drainages

0 to 30 percent

Aspen & Big Sagebrush

Vitrandic Xeropsamments

25 percent

Mountainsides

0 to 30 percent

Big Sagebrush & Bitterbrush

Soil Profile Description

Surface Layer

1 to 0 inches; decomposing Aspen leaves & twigs

0 to 10 inches; grayish brown & brown sand; massive; soft; pH 6.0

2 to 0 inch; decomposing Red fir & Jeffrey pine needles & twigs structure; soft; pH 5.6

0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 5.6

Subsoil

—

—

Substratum

10 to 60 inches; brown & light yellowish brown sand; massive; soft; pH 6.0

7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.4 inches)

Moderate (4.4 inches)

Water Retention Class

2 (1.9 inches)

2 (1.4 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.14

0.15

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

II

II

Class

2epx

2epx

Annual Forage Production (lb/acre)

400 to 800

200 to 400

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to Vitrandic Cryopsamments, but shallow hard bedrock, near rock outcroppings at higher elevations; Vitrandic Cryopsamments, at higher elevations; & rock outcrops. Included areas make up approximately 25 percent of the map unit area.

325 - Pass Canyon - Jaybee families - Rock outcrop complex, 15 to 60 percent slopes

Elevation: 6,300 to 8,000 feet

Annual Precipitation: 8 to 15 inches

Soil Map Unit Components

Approx Proportion

Pass Canyon family

Jaybee family

**Rock outcrop,
granitic, rhyolitic and
metasedimentary**

Landscape Position

Slope

Typical Vegetation

40 percent

Hillsides

15 to 60 percent

Pinyon Pine & Big Sagebrush

20 percent

Hillsides

15 to 60 percent

Pinyon Pine & Big Sagebrush

20 percent

Hillsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 5 inches; brown very cobbly & gravelly loamy sand; weak subangular blocky structure; soft; pH 6.2

0 to 4 inches; brown & pale brown extremely & very cobbly sandy loam; weak subangular blocky structure; soft; pH 7.1

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

5 to 13 inches; grayish brown sandy loam; moderate subangular blocky structure; hard; pH 6.7

4 to 15 inches; brown gravelly loam & clay loam; weak & moderate subangular blocky structure; soft to hard; pH 7.0

—

Substratum

13 inches; hard granitic, rhyolitic and metasedimentary bedrock

15 inches; hard granitic, rhyolitic and metasedimentary bedrock

—

Soil Properties

Restrictive Layer Depth

13 to 19 inches (HB)

15 to 20 inches (HB)

—

Effective Rooting Depth (inches)

Shallow (10 to 20 inches)

Shallow (10 to 20 inches)

—

Available Water Capacity

Very Low (1.2 inches)

Low (2.1 inches)

—

Water Retention Class

3 (1.2 inches)

2 (2.1 inches)

—

Hydrologic Soil Group

C-D

B-D

—

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Mod. Slow (0.2 to 0.6 in./hr.)

—

Drainage Class

Well

Well

—

Max Erosion Hazard

Low to High

Low to High

—

Erosion Factor (k)

0.05

0.10

—

Soil Productivity

Low

Moderate

—

Soil Manageability

Group

IV

IV

—

Class

4EPXgd

4EXgdp

—

Annual Forage Production (lb/acre)

< 300

300 to 600

—

Forest Survey Site Class

NC

NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Brantel & Delaney families, on hillsides; & the Fez family, in depressions. Included areas make up approximately 20 percent of the map unit unit area.

326 - Basket - Mascamp families complex, 30 to 60 percent slopes

Elevation: 6,400 to 8,400 feet

Annual Precipitation: 8 to 14 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Basket family

50 percent

Hillsides

30 to 60 percent

Pinyon Pine

Mascamp family

20 percent

Hillsides & Hilltops

30 to 60 percent

Pinyon Pine

Soil Profile Description

Surface Layer

0 to 2 inches; brown extremely gravelly sandy loam; weak subangular blocky structure; soft; pH 6.4

0 to 7 inches; brown extremely & very cobbly sandy loam; weak subangular blocky structure; soft; pH 6.3

Subsoil

2 to 38 inches; brown, dark yellowish brown & yellowish brown very gravelly clay loam; massive; soft to hard; pH 6.5

7 to 19 inches; dark yellowish brown very cobbly sandy loam; weak & moderate subangular blocky structure; slightly hard; pH 6.0

Substratum

38 inches; soft weathering marine sediments

19 inches; hard granitic bedrock

Soil Properties

Restrictive Layer Depth

38 inches (PC)

9 to 19 inches (HB)

Effective Rooting Depth (inches)

Mod. Deep (20 to 40 inches)

Shallow (10 to 20 inches)

Available Water Capacity

Low (3.2 inches)

Very Low (1.0 inches)

Water Retention Class

3 (1.0 inches)

3 (1.0 inches)

Hydrologic Soil Group

B-C

B-C

Permeability (in./hr.)

Mod. Slow (0.2 to 0.6 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Well

Well

Max Erosion Hazard

Moderate to high

Moderate to High

Erosion Factor (k)

0.15

0.15

Soil Productivity

Moderate

Moderate

Soil Manageability

Group

IV

IV

Class

4EPgx

4EPgdx

Annual Forage Production (lb/acre)

300 to 600

300 to 600

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Abgese family, on south & west-facing hillsides; Rock outcrop, granitic, on hillsides & ridges; the Brantel family, on mid to lower hillsides; the Neuske family; & a soil similar to the Mascamp family but shallow to soft bedrock. Included areas make up approximately 30 percent of the map unit area.

327 - Wrango family - Rock outcrop complex, 15 to 30 percent slopes

Elevation: 4,500 to 6,400 feet

Annual Precipitation: 4 to 8 inches

Soil Map Unit Components

Approx Proportion

Wrango family

40 percent

Rock outcrop, complex

25 percent

Landscape Position

Hillsides & Mountainsides

Hillsides & Mountainsides & Ridges

Slope

15 to 30 percent

15 to 30 percent

Typical Vegetation

Big Sagebrush

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 15 inches; grayish brown gravelly loamy coarse sand; single grain; loose; pH 6.8

Rock outcrop consists continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

15 to 60 inches; yellowish brown & light brown very gravelly & very cobbly coarse sand; massive; slightly hard; pH 6.8

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

28 to 60 inches

—

Available Water Capacity

Very Low (1.9 inches)

—

Water Retention Class

3 (1.1 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.15

—

Soil Productivity

Low to Moderate

—

Soil Manageability

Group

IV

—

Class

4PXe

—

Annual Forage Production (lb/acre)

300 to 500

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of shallow Xeric Torriorthents on hillsides & mountainsides; soil similar to shallow Xeric Torriorthents, but with less than 35 percent rock fragments; shallow Xeric Torriorthents; Torriorthentic Haploxerolls; the Mottsville family; & the Wrango family, 5 to 15 percent slopes, on bench terraces. Included areas make up approximately 35 percent of the map unit area.

328 - Wrango family - Torriorthentic Haploxerolls complex, 0 to 15 percent slopes

Elevation: 4,600 to 8,000 feet

Annual Precipitation: 4 to 17 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Wrango family

50 percent

Alluvial Fans, Bench Terraces & Outwash Plains

0 to 15 percent

Big Sagebrush & Bitterbrush

Torriorthentic Haploxerolls

20 percent

Alluvial Fans & Bench Terraces

0 to 15 percent

Big Sagebrush & Bitterbrush

Soil Profile Description

Surface Layer

0 to 15 inches; grayish brown gravelly loamy coarse sand; single grain; loose; pH 6.8

0 to 3 inches; brown gravelly sandy loam; single grain; loose; pH 6.5

Subsoil

—

3 to 20 inches; brown gravelly sandy loam; single grain; loose; pH 6.7 to 7.0

Substratum

15 to 60 inches; yellowish brown & light brown very gravelly & very cobbly coarse sand; massive; slightly hard; pH 6.8

20 to 60 inches; yellowish brown very cobbly sandy loam; massive; very hard; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Very Low (1.9 inches)

Moderate (5.4 inches)

Water Retention Class

3 (1.1 inches)

2 (1.8 inches)

Hydrologic Soil Group

A

B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.15

0.22

Soil Productivity

Low to Moderate

Moderate

Soil Manageability

Group

III

II

Class

3P

2p

Annual Forage Production (lb/acre)

300 to 500

400 to 800

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Chesaw family, but warmer, the Berent family, Xerofluvents, on alluvial fans and bench terraces; the Kiona family, on outwash plains and rock outcrop. Included areas make up approximately 30 percent of the map unit area.

329 - Wrango family - Torriorthentic Haploxerolls complex, 15 to 30 percent slopes

Elevation: 5,000 to 8,800 feet

Annual Precipitation: 6 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Wrango family

50 percent

Alluvial Fans & Moraines

15 to 30 percent

Big Sagebrush & Bitterbrush

Torriorthentic Haploxerolls

15 percent

Alluvial Fans & Moraines

15 to 30 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 15 inches; grayish brown gravelly loamy coarse sand; single grain; loose; pH 6.8

0 to 3 inches; brown gravelly sandy loam; single grain; loose; pH 6.5

Subsoil

—

3 to 20 inches; brown gravelly sandy loam; single grain; loose; pH 6.7 to 7.0

Substratum

15 to 60 inches; yellowish brown & light brown very gravelly & very cobbly coarse sand; massive; slightly hard; pH 6.8

20 to 60 inches; yellowish brown very cobbly sandy loam; massive; very hard; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Very Low (1.9 inches)

Moderate (5.4 inches)

Water Retention Class

3 (1.1 inches)

2 (1.8 inches)

Hydrologic Soil Group

A

B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.15

0.22

Soil Productivity

Low to Moderate

Moderate

Soil Manageability

Group

III

II

Class

3Pe

2ep

Annual Forage Production (lb/acre)

300 to 500

400 to 800

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Chesaw family, but warmer, the Berent family; a soil similar to Torriorthent Haploxerolls, but with a lighter colored surface layer; the Kiona family, in outwash plains and Rock outcrop. Included areas make up approximately 35 percent of the map unit area.

330 - Wrango family - Torriorthentic Haploxerolls complex, 30 to 60 percent slopes

Elevation: 4,800 to 8,800 feet

Annual Precipitation: 6 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Wrango family

50 percent

Alluvial Fans, Bench Terraces & Outwash Plains

30 to 60 percent

Big Sagebrush & Bitterbrush

Torriorthentic Haploxerolls

20 percent

Alluvial Fans & Bench Terraces

30 to 60 percent

Big Sagebrush & Bitterbrush

Soil Profile Description

Surface Layer

0 to 15 inches; grayish brown gravelly loamy coarse sand; single grain; loose; pH 6.8

0 to 3 inches; brown gravelly sandy loam; single grain; loose; pH 6.5

Subsoil

—

3 to 20 inches; brown gravelly sandy loam; single grain; loose; pH 6.7 to 7.0

Substratum

15 to 60 inches; yellowish brown & light brown very gravelly & very cobbly coarse sand; massive; slightly hard; pH 6.8

20 to 60 inches; yellowish brown very cobbly sandy loam; massive; very hard; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Very Low (1.9 inches)

Moderate (5.4 inches)

Water Retention Class

3 (1.1 inches)

2 (1.8 inches)

Hydrologic Soil Group

A

B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Moderate to High

Erosion Factor (k)

0.15

0.22

Soil Productivity

Low to Moderate

Moderate

Soil Manageability

Group

IV

III

Class

4EPgx

3Egpx

Annual Forage Production (lb/acre)

300 to 500

400 to 800

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Chesaw family, on fans, at higher elevations; Kiona & Berent families, on alluvial fans & Rock outcrops. Included areas make up approximately 25 percent of the map unit area.

331 - Koehler - Stacy families complex, 0 to 15 percent slopes

Elevation: 6,500 to 8,000 feet

Annual Precipitation: 8 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Koehler family

45 percent

Alluvial Fans & Depressions

0 to 15 percent

Big Sagebrush & Bitterbrush

Stacy family

40 percent

Alluvial Fans & Valley Bottoms

0 to 15 percent

Big Sagebrush & Bitterbrush

Soil Profile Description

Surface Layer

0 to 3 inches; light brownish gray loamy sand; weak granular structure; soft; pH 6.4

0 to 6 inches; dark brown & brown very fine sandy loam & loamy sand; thin platy & weak subangular blocky structure; soft; pH 6.3

Subsoil

3 to 37 inches; pale brown loamy sand; weak subangular blocky structure & massive; slightly hard & hard; pH 6.7

—

Substratum

37 inches; silica-calcium carbonate duripan

6 to 60 inches; yellowish brown, brown & dark brown fine sandy loam & loamy sand; moderate subangular blocky structure & massive; soft & hard; pH 6.4

Soil Properties

Restrictive Layer Depth

20 to 40 inches (DP)

Greater than 60 inches

Effective Rooting Depth (inches)

Mod. Deep (20 to 40 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.5 inches)

Moderate (7.1 inches)

Water Retention Class

2 (1.4 inches)

2 (1.9 inches)

Hydrologic Soil Group

C-D

B-C

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Moderate (0.60 to 2 in./hr.)

Drainage Class

Somewhat Excessively

Well

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.26

0.32

Soil Productivity

Low

Low to Moderate

Soil Manageability

Group

II

II

Class

2p

2p

Annual Forage Production (lb/acre)

200 to 400

200 to 600

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Calpine family, in alluvial depressions & Vitrandic Xeropsammets, in other alluvial deposits. Included areas make up approximately 15 percent of the map unit area.

332 - Biglake family, 0 to 15 percent slopes

Elevation: 6,800 to 7,700 feet

Annual Precipitation: 10 to 14 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Biglake family

85 percent

Alluvial Depressions

0 to 15 percent

Bitterbrush & Big Sagebrush

Soil Profile Description

Surface Layer

0 to 15 inches; grayish brown coarse sand; weak granular structure; soft; pH 7.0

Subsoil

—

Substratum

15 to 60 inches; brown & yellowish brown gravelly & extremely cobbly coarse sand; weak & moderate subangular blocky structure; soft; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth
(inches)

Very Deep (> 60 inches)

Available Water Capacity

Very Low (1.5 inches)

Water Retention Class

3 (0.8 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Very Rapid (20+ in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low

Erosion Factor (k)

0.10

Soil Productivity

Low

Soil Manageability

Group

III

Class

3P

Annual Forage Production
(lb/acre)

200 to 600

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Chesaw & Haypress families. Included areas make up approximately 15 percent of the map unit area.

333 - Bearskin family - Rock outcrop complex, 0 to 30 percent slopes

Elevation: 6,800 to 8,200 feet

Annual Precipitation: 10 to 14 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Bearskin family

60 percent

Basalt Flows

0 to 30 percent

Pinyon Pine & Mtn Mahogany

Rock outcrop, basalt

25 percent

Basalt Flows & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 2 inches; brown gravelly loamy fine sand;
weak granular structure; soft; pH 6.4

Rock outcrop consists of bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

2 to 10 inches; grayish brown & brown gravelly sandy loam; moderate subangular blocky structure; slightly hard; pH 6.5

—

Substratum

10 inches; hard basalt bedrock

—

Soil Properties

Restrictive Layer Depth

10 to 20 inches (HB)

—

Effective Rooting Depth (inches)

Shallow (10 to 20 inches)

—

Available Water Capacity

Very Low (0.8 inches)

—

Water Retention Class

3 (0.8 inches)

—

Hydrologic Soil Group

C-D

—

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

—

Drainage Class

Well

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.17

—

Soil Productivity

Low to Moderate

—

Soil Manageability

Group

IV

—

Class

4PXed

—

Annual Forage Production (lb/acre)

300 to 600

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Bearskin family, but has no argillic horizon & the Jaybee family. Included areas make up approximately 15 percent of the map area.

334 - Rock outcrop - Bearskin family complex, 60 to 90 percent slopes

Elevation: 6,800 to 7,800 feet

Annual Precipitation: 10 to 14 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Rock outcrop, basalt

60 percent

Hillsides & Ridges

—

Barren

Bearskin family

25 percent

Hillsides & Basalt Flows

60 to 90 percent

Big Sagebrush & Bitterbrush

Soil Profile Description

Surface Layer

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 2 inches; brown gravelly loamy fine sand; weak granular structure; soft; pH 6.4

Subsoil

—

2 to 10 inches; grayish brown & brown gravelly sandy loam; moderate subangular blocky structure; slightly hard; pH 6.5

Substratum

—

10 inches; hard basalt bedrock

Soil Properties

Restrictive Layer Depth

—

10 to 20 inches (HB)

Effective Rooting Depth (inches)

—

5 to 10 inches

Available Water Capacity

—

Very Low (0.8 inches)

Water Retention Class

—

3 (0.8 inches)

Hydrologic Soil Group

—

C-D

Permeability (in./hr.)

—

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

—

Well

Max Erosion Hazard

—

High to Very High

Erosion Factor (k)

—

0.17

Soil Productivity

—

Low to Moderate

Soil Manageability

Group

—

IV

Class

—

4GEPXd

Annual Forage Production (lb/acre)

—

300 to 600

Forest Survey Site Class

—

NC

Included Areas & Remarks

Included in this map unit are small areas of the Mascamp & Jaybee families. Included areas make up approximately 15 percent of the map unit area.

335 - Neuske - Basket families complex, 30 to 60 percent slopes

Elevation: 7,200 to 8,600 feet

Annual Precipitation: 12 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Neuske family

60 percent

Hillsides

30 to 60 percent

Pinyon Pine & Big Sagebrush

Basket family

20 percent

Hillsides

30 to 60 percent

Pinyon Pine & Bitterbrush

Soil Profile Description

Surface Layer

0 to 2 inches; brown gravelly fine sandy loam; weak granular structure; soft; pH 6.2

0 to 2 inches; brown extremely gravelly sandy loam; weak subangular blocky structure; soft; pH 6.4

Subsoil

2 to 20 inches; brown gravelly loam & light yellowish brown clay loam; weak and moderate subangular blocky structure; soft, slightly hard; pH 6.5

2 to 38 inches; brown, dark yellowish brown & yellowish brown very gravelly clay loam; massive; soft to hard; pH 6.5

Substratum

20 to 44 inches; light yellowish brown very cobbly loam; massive; slightly hard; pH 6.5

38 inches; soft weathering metasedimentary bedrock

44 inches; soft weathered granitic and metasedimentary bedrock

Soil Properties

Restrictive Layer Depth

44 inches (PC)

38 inches (FB)

Effective Rooting Depth (inches)

Deep (40 to 60 inches)

Mod. Deep (20 to 40 inches)

Available Water Capacity

Moderate (5.7 inches)

Low (3.2 inches)

Water Retention Class

1 (3.2 inches)

3 (1.0 inches)

Hydrologic Soil Group

B-C

B-C

Permeability (in./hr.)

Mod. Slow (0.2 to 0.6 in./hr.)

Mod. Slow (0.2 to 0.6 in./hr.)

Drainage Class

Well

Well

Max Erosion Hazard

Moderate to High

Moderate to High

Erosion Factor (k)

0.32

0.15

Soil Productivity

Moderate

Moderate

Soil Manageability

Group

III

IV

Class

3Eg

4EPg

Annual Forage Production (lb/acre)

400 to 800

300 to 600

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Brantel & Berent families, on hillsides & Vitrandic Xeropsamments & Rock outcrops, on hillsides & ridges. Included areas make up approximately 20 percent of the map unit area.

336 - Credo - Mascamp families complex, 15 to 60 percent slopes

Elevation: 7,500 to 8,800 feet

Annual Precipitation: 12 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Credo family

50 percent

Hillsides & Mountainsides

15 to 60 percent

Pinyon Pine & Big Sagebrush

Mascamp family

25 percent

Hillsides & Mountainsides

15 to 60 percent

Pinyon Pine & Big Sagebrush

Soil Profile Description

Surface Layer

1 to 0 inch; decomposing Big Sagebrush & Bitterbrush twigs & leaves

0 to 7 inches; brown extremely & very cobbly sandy loam; weak subangular blocky structure; soft; pH 6.3

Subsoil

0 to 5 inches; grayish brown cobbly loam; weak subangular blocky structure; slightly hard; pH 6.6

5 to 29 inches; light brown & brown loam & clay loam; moderate subangular blocky structure; slightly hard & hard; pH 6.4

7 to 19 inches; dark yellowish brown very cobbly sandy loam; weak & moderate subangular blocky structure; slightly hard; pH 6.0

Substratum

29 to 57 inches; highly weathered granitic & metasedimentary bedrock

19 inches; hard granitic bedrock

Soil Properties

Restrictive Layer Depth

29 to 60 inches (PC)

9 to 19 inches (HB)

Effective Rooting Depth (inches)

Mod. Deep (20 to 40 inches)

Shallow (10 to 20 inches)

Available Water Capacity

Moderate (4.1 inches)

Very Low (1.0 inches)

Water Retention Class

1 (2.6 inches)

3 (1.0 inches)

Hydrologic Soil Group

B-C

B-C

Permeability (in./hr.)

Mod. Slow (0.2 to 0.6 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Well

Well

Max Erosion Hazard

Low to High

Low to High

Erosion Factor (k)

0.28

0.15

Soil Productivity

Moderate

Moderate

Soil Manageability

Group

III

IV

Class

3Egx

4EPgdx

Annual Forage Production (lb/acre)

300 to 800

300 to 600

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Corbett family & Vitrandic Xeropsamments, on hillsides and mountainsides; the Bearskin family, on foothills & toeslopes; & Rock outcrop on ridges. Included areas make up approximately 25 percent of the map unit area.

337 - Vitrandic Xerorthents - Vitrandic Xeropsamments complex, 30 to 70 percent slopes

Elevation: 7,200 to 11,200 feet

Annual Precipitation: 10 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Xerorthents

40 percent

Mountainsides

30 to 70 percent

Mountain Mahogany & Juniper

Vitrandic Xeropsamments

25 percent

Mountainsides

30 to 70 percent

Mountain Mahogany & Juniper

Soil Profile Description

Surface Layer

1 to 0 inches; decomposing Mountain Mahogany and Juniper needles, twigs & small branches

2 to 0 inch; decomposing Red fir & Jeffrey pine needles & twigs

0 to 4 inches; brown & pinkish gray extremely gravelly loamy sand; massive; soft; pH 5.5

0 to 7 inches; pale brown loamy coarse sand; weak granular structure; soft; pH 5.6

Subsoil

—

—

Substratum

4 to 60 inches; very pale brown & brown extremely gravelly coarse sand; single grain; loose; pH 5.0 to 6.0

7 to 60 inches; very pale brown & light gray loamy sand; weak granular structure; soft; pH 4.9

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Very Low (0.8 inches)

Moderate (4.4 inches)

Water Retention Class

3 (0.3 inches)

2 (1.4 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Moderate to Very High

Moderate to Very High

Erosion Factor (k)

0.10

0.15

Soil Productivity

Very Low

Low

Soil Manageability

Group

IV

III

Class

4EPgx

3Epgx

Annual Forage Production (lb/acre)

200 to 400

200 to 400

Forest Survey Site Class

6-NC

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Nanamkin family, but with high ash, pumice & obsidian influence; Vitrandic Xerorthents, pumiceous, Vitrandic Xerorthents, ashy, Vitrandic Cryorthents, at approximately 35 percent of the

338 - Ola - Glean families complex, 15 to 30 percent slopes

Elevation: 7,500 to 10,200 feet

Annual Precipitation: 12 to 30 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Ola family

50 percent

Mountainsides & Benches

15 to 30 percent

Bitterbrush & Big Sagebrush

Glean family

30 percent

Mountainsides

15 to 30 percent

Big Sagebrush & Bitterbrush

Soil Profile Description

Surface Layer

0 to 12 inches; brown sandy loam; weak granular & subangular blocky structure; soft; pH 6.3

0 to 1 inch; dark grayish brown extremely stony loamy sand; single grain; loose; pH 6.4

Subsoil

12 to 38 inches; brown sandy loam & cobbly sandy loam; massive; soft; pH 6.5

1 to 15 inches; brown very stony & very cobbly sandy loam; weak granular structure; soft; pH 6.7

Substratum

38 inches; hard basalt bedrock

15 to 60 inches; brown very cobbly sandy loam; massive; soft; pH 6.9

Soil Properties

Restrictive Layer Depth

21 to 40 inches (HB)

Greater than 60 inches

Effective Rooting Depth (inches)

Mod. Deep (20 to 40 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.9 inches)

Moderate (4.4 inches)

Water Retention Class

2 (2.0 inches)

2 (1.3 inches)

Hydrologic Soil Group

C

B

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Well

Well

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.24

0.05

Soil Productivity

Moderate

Moderate

Soil Manageability

Group

II

II

Class

2epx

2epx

Annual Forage Production (lb/acre)

300 to 800

300 to 600

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of Vitrandic Xerorthents, the Fez family, Vitrandic Xeropsamments & Rock outcrop. Included areas make up approximately 20 percent of the map unit area.

339 - Wrango family - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 4,400 to 5,700 feet

Annual Precipitation: 4 to 6 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Wrango family

50 percent

Hillsides

30 to 60 percent

Big Sagebrush & Bitterbrush

Rock outcrop, granitic

25 percent

Hillsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 15 inches; grayish brown loamy coarse sand; single grain; loose; pH 6.8

Rock outcrop consists of bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

15 to 60 inches; light brown very cobbly coarse sand; massive; slightly hard; pH 6.8

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Very Low (1.9 inches)

—

Water Retention Class

3 (1.1 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low

—

Erosion Factor (k)

0.15

—

Soil Productivity

Moderate to High

—

Soil Manageability

Group

IV

—

Class

4EPXg

—

Annual Forage Production (lb/acre)

300 to 500

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Atter, Mottsville families, Torriorthentic Haploxerolls, on hillsides and Xeric Torriorthents, on foothills, near rock outcrops. Included areas make up approximately 25 percent of the map unit area.

340 - Salt Chuck Family - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 8,000 to 9,600 feet

Annual Precipitation: 15 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Salt Chuck family

60 percent

Mountainsides

30 to 60 percent

Lodgepole Pine & Big Sagebrush

Rock outcrop

20 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 14 inches; dark grayish brown & brown extremely stony loamy sand; single grain; loose; pH 5.9

Rock outcrop consists of bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

14 to 33 inches; light yellowish brown & light gray very gravelly & extremely stony loamy sand; massive; slightly hard; pH 6.1

—

33 inches; soft decomposing granitic bedrock

Soil Properties

Restrictive Layer Depth

33 inches (FB)

—

Effective Rooting Depth (inches)

Mod. Deep (20 to 40 inches)

—

Available Water Capacity

Very Low (0.5 inches)

—

Water Retention Class

3 (0.5 inches)

—

Hydrologic Soil Group

B-C

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Moderate to High

—

Erosion Factor (k)

0.05

—

Soil Productivity

Low

—

Soil Manageability

Group

IV

—

Class

4EPXg

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

6-7

—

Included Areas & Remarks

Included in this map unit are small areas of the Garlet family & Lithic Cryorthents, on mountainsides, near rock outcrops. Included areas make up approximately 20 percent of the map unit area.

341 - Delaney - Berent families - Rock outcrop complex, 15 to 60 percent slopes

Elevation: 7,300 to 8,800 feet

Annual Precipitation: 10 to 18 inches

Soil Map Unit Components

Approx Proportion

Delaney family

Berent family

**Rock outcrop,
rhyolitic**

Landscape Position

Slope

Typical Vegetation

30 percent

Mountainsides

15 to 60 percent

Big Sagebrush & Bitterbrush

25 percent

Toeslopes & Mountainsides

15 to 60 percent

Big Sagebrush & Bitterbrush

20 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 10 inches; light brownish gray
gravelly loamy sand; weak very
fine granular structure; soft; pH 6.4

0 to 4 inches; light yellowish
brown loamy sand; weak
granular structure; soft; pH 7.4

Rock outcrop consists of bare
bedrock & less than 15 percent
inclusions of soil material capable
of supporting plants.

Subsoil

—

—

—

Substratum

10 to 23 inches; brown loamy sand
& gravelly loamy sand; massive;
slightly hard; pH 6.4

4 to 60 inches; light yellowish
brown loamy sand & sand;
massive; soft; pH 7.2

—

23 inches; hard rhyolitic bedrock

Soil Properties

Restrictive Layer Depth

23 inches (HB)

Greater than 60 inches

—

Effective Rooting Depth
(inches)

Mod. Deep (20 to 40 inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Very Low (1.4 inches)

Low (3.9 inches)

—

Water Retention Class

3 (1.2 inches)

3 (1.1 inches)

—

Hydrologic Soil Group

B-C

A-B

—

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

Somewhat Excessively

—

Max Erosion Hazard

Low to High

Low to High

—

Erosion Factor (k)

0.15

0.15

—

Soil Productivity

Low

Low

—

Soil Manageability

Group

IV

IV

—

Class

4EPXgd

4EPXg

—

Annual Forage Production
(lb/acre)

200 to 400

200 to 400

—

Forest Survey Site Class

NC

NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Mascamp & Brantel families, Vitrandic Torri- orthents, ashy & Vitrandic Xerorthents. Included area make up approximately 25 percent of the map area.

342 - Lithic Cryorthents - Stecum family - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 8,600 to 12,900 feet Annual Precipitation: 20 to 30 inches

Soil Map Unit Components	Lithic Cryorthents	Stecum family	Rock outcrop, granitic
Approx Proportion	30 percent	30 percent	20 percent
Landscape Position	Mountainsides	Mountainsides & Mountaintops	Mountainsides & Ridges
Slope	30 to 60 percent	30 to 60 percent	—
Typical Vegetation	Bitterbrush & Big Sagebrush	Perennial Grasses	Barren

Soil Profile Description

Surface Layer	0 to 2 inches; pale brown extremely stony loamy sand; single grain; loose; pH 6.0	0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5	Rock outcrop consists of bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5	—
Substratum	2 to 18 inches; pale brown very stony & gravelly loamy sand; massive; soft; pH 6.4	24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; soft; pH 5.5	—
	18 inches; hard granitic bedrock		

Soil Properties

Restrictive Layer Depth	16 to 18 inches (HB)	Greater than 60 inches	—
Effective Rooting Depth (inches)	Shallow (10 to 20 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (0.7 inches)	Very Low (2.0 inches)	—
Water Retention Class	3 (0.7 inches)	3 (0.8 inches)	—
Hydrologic Soil Group	B-C	A	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)	—
Drainage Class	Somewhat Excessively	Somewhat Excessively	—
Max Erosion Hazard	Moderate to High	Moderate to High	—
Erosion Factor (k)	0.05	0.10	—
Soil Productivity	Low	Low to Moderate	—
Soil Manageability			
Group	IV	IV	—
Class	4EPXgd	4EPXg	—
Annual Forage Production (lb/acre)	200 to 400	200 to 500	—
Forest Survey Site Class	NC	NC	—

Included Areas & Remarks

Included in this map unit are small areas of the Salt Chuck, Garlet, & Haypress families, on mountainsides. Included areas make up approximately 20 percent of the map unit area.

343 - Preston - Pass Canyon families association, 30 to 60 percent slopes

Elevation: 4,800 to 9,100 feet

Annual Precipitation: 5 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Preston family

45 percent

East-facing Sideslopes of Foothills

30 to 60 percent

Big Sagebrush & Bitterbrush

Pass Canyon family

30 percent

North-facing Sideslopes of Foothills & Drainages

30 to 60 percent

Big Sagebrush & Bitterbrush

Soil Profile Description

Surface Layer

4 to 0 inch; decomposing Big Sagebrush leaves and twigs

0 to 5 inches; brown very cobbly & gravelly loamy sand; weak subangular blocky structure; soft; pH 6.2

0 to 2 inches; dark grayish brown cobbly loamy sand; weak granular structure; soft; pH 6.7

Subsoil

—

5 to 13 inches; grayish brown sandy loam; moderate subangular blocky structure; hard; pH 6.7

Substratum

2 to 60 inches; pale brown & light brownish gray loamy sand; weak subangular blocky & massive structure; soft & slightly hard; pH 6.6

13 inches; hard granitic, rhyolitic, metasedimentary bedrock

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

13 to 19 inches (HB)

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Shallow (10 to 20 inches)

Available Water Capacity

Low (3.9 inches)

Very Low (1.2 inches)

Water Retention Class

2 (1.3 inches)

3 (1.2 inches)

Hydrologic Soil Group

A-B

C-D

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Somewhat Excessively

Well

Max Erosion Hazard

Moderate to High

Moderate to High

Erosion Factor (k)

0.22

0.05

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

III

IV

Class

3Egpx

4EPgdx

Annual Forage Production (lb/acre)

200 to 500

< 300

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Wrango & Atter families, Torriorthentic Haploxerolls & granitic Rock outcrops. Included areas make up approximately 25 percent of the map unit area.

344 - Vitrandic Xerorthents, ashy - Rock outcrop complex, 15 to 30 percent slopes

Elevation: 7,800 to 9,100 feet

Annual Precipitation: 15 to 20 inches

Soil Map Unit Components

Approx Proportion

Vitrandic Xerorthents, ashy

Rock outcrop, basalt, metasedimentary

Landscape Position

50 percent

25 percent

Slope

Mountainsides

Mountainsides & Ridges

Typical Vegetation

15 to 30 percent

—

Jeffrey Pine & Big Sagebrush

Barren

Soil Profile Description

Surface Layer

1 to 0 inches; decomposing Jeffrey Pine needles, twigs & small branches

Rock outcrop consists of bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 4 inches; brown gravelly loamy sand; massive; soft; pH 6.0

Subsoil

—

—

Substratum

4 to 60 inches; pale brown, brown & pinkish gray extremely gravelly coarse sand, very gravelly & gravelly loamy sand & loamy sand; loose & soft; pH 5.1 to 5.9

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Deep (40 to 60 inches)

—

Available Water Capacity

Moderate (5.5 inches)

—

Water Retention Class

2 (1.7 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.10

—

Soil Productivity

Low

—

Soil Manageability

Group

II

—

Class

2ep

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

5-7

—

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to Vitrandic Haploxerolls, pumiceous but with mixed & pumiceous mineralogy, on Mountain terraces; Vitrandic Xeropsamments, Vitrandic Xerorthents, pumiceous & Vitrandic Xerorthents, warm. Included areas make up approximately 25 percent of the map unit area.

345 - Corbett - Nanamkin families - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 7,200 to 9,800 feet

Annual Precipitation: 10 to 25 inches

Soil Map Unit Components	Corbett family	Nanamkin family	Rock outcrop, granitic
Approx Proportion	35 percent	25 percent	15 percent
Landscape Position	Mountainsides	Mountainsides	Mountainsides & Ridges
Slope	30 to 60 percent	30 to 60 percent	—
Typical Vegetation	Lodgepole & Jeffrey Pine	Lodgepole Pine & Big Sagebrush	Barren

Soil Profile Description

Surface Layer	0 to 3 inches; light brownish gray gravelly loamy sand; weak subangular blocky structure; soft; pH 6.0	0 to 7 inches; brown very cobbly loamy sand; weak subangular blocky structure; soft; pH 7.0	Rock outcrop consists of bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	—	—
Substratum	3 to 52 inches; light gray & white gravelly loamy sand & extremely gravelly loamy sand; massive; soft; pH 6.5	7 to 60 inches; yellowish brown very cobbly loamy sand; massive; soft; pH 7.0	—
	52 inches; soft granitic bedrock		

Soil Properties

Restrictive Layer Depth	52 inches (FB)	Greater than 60 inches	—
Effective Rooting Depth (inches)	Deep (40 to 60 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Low (2.4 inches)	Very Low (2.3 inches)	—
Water Retention Class	3 (1.1 inches)	3 (0.8 inches)	—
Hydrologic Soil Group	A	A	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)	—
Drainage Class	Somewhat Excessively	Somewhat Excessively	—
Max Erosion Hazard	Moderate to High	Moderate to High	—
Erosion Factor (k)	0.17	0.05	—
Soil Productivity	Very Low	Low	—
Soil Manageability			
Group	IV	IV	—
Class	4EPgx	4EPgx	—
Annual Forage Production (lb/acre)	< 200	200 to 400	—
Forest Survey Site Class	5-7	6-7	—

Included Areas & Remarks

Included in this map unit are small areas of the Stecum, at higher elevations, Haypress, Biglake, families, Vitrandic Xeropsamments & Vitrandic Xerochrepts. Included areas make up approximately 25 percent of the map unit area.

346 - Atter family, 15 to 60 percent slopes

Elevation: 6,500 to 7,600 feet

Annual Precipitation: 4 to 10 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Atter family

75 percent

Hillsides & Mountainsides

15 to 60 percent

Big Sagebrush & Bitterbrush

Soil Profile Description

Surface Layer

0 to 2 inches; brown extremely stony sandy loam;
single grain; loose; pH 6.4

Subsoil

—

Substratum

2 to 44 inches; pale red extremely stony loamy
sand; strong subangular blocky structure; loose to
hard; pH 6.5

44 inches; granitic glacial till

Soil Properties

Restrictive Layer Depth

44 inches (PC)

Effective Rooting Depth
(inches)

Deep (40 to 60 inches)

Available Water Capacity

Very Low (0.6 inches)

Water Retention Class

3 (0.3 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low to High

Erosion Factor (k)

0.10

Soil Productivity

Low to Moderate

Soil Manageability

Group

IV

Class

4EPXg

Annual Forage Production
(lb/acre)

300 to 500

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Wrango & Kilburn families, at higher elevations, the Nanamkin family & Rock outcrop. Included areas make up approximately 25 percent of the map unit area.

347 - Nanamkin family - Rock outcrop complex, 15 to 60 percent slopes

Elevation: 6,500 to 11,000 feet

Annual Precipitation: 10 to 30 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Nanamkin family

50 percent

Mountainsides

15 to 60 percent

Mountain Mahogany

Rock outcrop, basalt & granitics

25 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 7 inches; brown very cobbly loamy sand; weak subangular blocky structure; soft; pH 7.0

Rock outcrop consists of bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

7 to 60 inches; yellowish brown very cobbly loamy sand; massive; soft; pH 7.0

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Very Low (2.3 inches)

—

Water Retention Class

3 (0.8 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low to High

—

Erosion Factor (k)

0.05

—

Soil Productivity

Low

—

Soil Manageability

Group

IV

—

Class

4EPXg

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Biglake & Railcity families, on lower and mid- elevation mountainsides, the Powment family, near rock outcrops & the Stecum family, on higher elevation mountainsides. Included areas make up approximately 25 percent of the map unit area.

348 - Kilburn family, 5 to 30 percent slopes

Elevation: 6,700 to 9,300 feet

Annual Precipitation: 10 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Kilburn family

75 percent

Hillsides, Alluvial Fans & Moraines

5 to 30 percent

Pinyon Pine & Big Sagebrush

Soil Profile Description

Surface Layer

0 to 12 inches; brown & grayish brown gravelly loamy sand & very cobbly sandy loam; weak subangular blocky structure; soft; pH 6.9

Subsoil

12 to 60 inches; yellowish brown & light yellowish brown extremely cobbly coarse sandy loam; moderate subangular blocky structure; slightly hard; pH 7.0

Substratum

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth
(inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.3 inches)

Water Retention Class

3 (1.1 inches)

Hydrologic Soil Group

B

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Well

Max Erosion Hazard

Low to Moderate

Erosion Factor (k)

0.15

Soil Productivity

Moderate

Soil Manageability

Group

III

Class

3Pe

Annual Forage Production
(lb/acre)

300 to 500

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Sur family, on hillsides, the Wrango family, on alluvial fans, the Chesaw family, on hillsides with Aspen vegetation, a soil similar to the Abgese family, on lower elevation moraines & Rock outcrops. Included areas make up approximately 25 percent of the map unit area.

349 - Rock outcrop - Biglake family complex, 30 to 70 percent slopes

Elevation: 7,800 to 11,000 feet

Annual Precipitation: 14 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Rock outcrop, granitics

40 percent

Mountainsides & Ridges

—

Barren

Biglake family

35 percent

Moraines

30 to 70 percent

Mountain Mahogany

Soil Profile Description

Surface Layer

Rock outcrop consists of bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 15 inches; grayish brown coarse sand; weak granular structure; soft; pH 7.0

Subsoil

—

—

Substratum

—

15 to 60 inches; brown & yellowish brown gravelly & extremely cobbly coarse sand; weak & moderate subangular blocky structure; soft; pH 7.0

Soil Properties

Restrictive Layer Depth

—

Greater than 60 inches

Effective Rooting Depth (inches)

—

Very Deep (> 60 inches)

Available Water Capacity

—

Very Low (1.5 inches)

Water Retention Class

—

3 (0.8 inches)

Hydrologic Soil Group

—

A

Permeability (in./hr.)

—

Very Rapid (20+ in./hr.)

Drainage Class

—

Somewhat Excessively

Max Erosion Hazard

—

Moderate to Very High

Erosion Factor (k)

—

0.10

Soil Productivity

—

Low

Soil Manageability

Group

—

IV

Class

—

4EPXg

Annual Forage Production (lb/acre)

—

200 to 600

Forest Survey Site Class

—

NC

Included Areas & Remarks

Included in this map unit are small areas of the Railcity & Nanamkin families, at higher elevations, the Salt Chuck family, near rock outcrops, & the Waterman family. Included areas make up approximately 25 percent of the map unit area.

350 - Sur - Kiona families complex, 15 to 60 percent slopes

Elevation: 4,600 to 7,700 feet

Annual Precipitation: 4 to 14 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Sur family

35 percent

Lateral Moraines

15 to 60 percent

Big Sagebrush & Bitterbrush

Kiona family

35 percent

Lateral Moraines

15 to 60 percent

Bitterbrush & Big Sagebrush

Soil Profile Description

Surface Layer

0 to 12 inches; brown gravelly loamy sand & very cobbly sandy loam; weak & moderate subangular blocky structure; soft; pH 6.7

0 to 4 inches; light yellowish brown extremely stony sandy loam; weak platy structure; soft; pH 7.0

Subsoil

—

4 to 35 inches; brown & pale brown very gravelly & extremely cobbly sandy loam; moderate subangular blocky structure; slightly hard; pH 7.0

Substratum

12 to 60 inches; pale brown very cobbly & very gravelly sandy loam; massive; very hard; pH 6.7

35 to 65 inches; pale brown & yellowish brown gravelly loamy sand, loamy sand & very cobbly sandy loam; massive; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.3 inches)

Low (2.8 inches)

Water Retention Class

2 (1.3 inches)

3 (0.8 inches)

Hydrologic Soil Group

B

B

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Well

Well

Max Erosion Hazard

Low to High

Low to High

Erosion Factor (k)

0.10

0.15

Soil Productivity

Low to Moderate

Moderate

Soil Manageability

Group

III

III

Class

3Ep

3EP

Annual Forage Production (lb/acre)

300 to 500

300 to 600

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Calpine family, but less than 20 inches to soft bedrock, on colluvial outwash fans; a soil similar to the Abgese family, but with a duripan within 40 inches of surface; the Wrango family & Rock outcrop. Included areas make up approximately 30 percent of the map unit area.

351 - Mottsville family, 0 to 15 percent slopes

Elevation: 4,000 to 4,800 feet

Annual Precipitation: 4 to 6 inches

Soil Map Unit Components

Approx Proportion

Mottsville family

85 percent

Landscape Position

Glacial Outwash Fans

Slope

0 to 15 percent

Typical Vegetation

Bitterbrush

Soil Profile Description

Surface Layer

1/4 to 0 inch; decomposing Big Sagebrush leaves & twigs

Subsoil

0 to 19 inches; grayish brown gravelly sandy loam & loamy coarse sand; weak granular structure; soft; pH 6.0 to 6.5

Substratum

19 to 25 inches; grayish brown gravelly coarse sand; weak subangular blocky structure; soft; pH 6.8

25 to 60 inches; grayish brown gravelly loamy sand; weak subangular blocky structure; soft; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.2 inches)

Water Retention Class

3 (1.2 inches)

Hydrologic Soil Group

A

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Somewhat Excessively

Max Erosion Hazard

Low

Erosion Factor (k)

0.25

Soil Productivity

Low to Moderate

Soil Manageability

Group

III

Class

3P

Annual Forage Production (lb/acre)

200 to 500

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Berent & Preston families. Included areas makeup approximately 15 percent of the map unit area.

352 - Rock outcrop - Biglake - Salt Chuck families complex, 30 to 60 percent slopes

Elevation: 7,200 to 10,600 feet

Annual Precipitation: 14 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Rock outcrop, granitic

35 percent

Moraine Sideslopes & Ridges

—

Barren

Biglake family

25 percent

Moraine Sideslopes

30 to 60 percent

Mountain Mahogany

Salt Chuck family

15 percent

Moraine Sideslopes

30 to 60 percent

Lodgepole Pine

Soil Profile Description

Surface Layer

Rock outcrop consists of bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 15 inches; grayish brown coarse sand; weak granular structure; soft; pH 7.0

0 to 14 inches; dark grayish brown & brown extremely stony loamy sand; single grain; loose; pH 5.9

Subsoil

—

—

—

Substratum

—

15 to 60 inches; brown & yellowish brown gravelly & extremely cobbly coarse sand; weak & moderate subangular blocky structure; soft; pH 7.0

14 to 33 inches; light yellowish brown & light gray very gravelly & extremely stony loamy sand; massive; slightly hard; pH 6.1

33 inches; soft decomposing granitic bedrock

Soil Properties

Restrictive Layer Depth

—

Greater than 60 inches

33 inches (FB)

Effective Rooting Depth (inches)

—

Very Deep (> 60 inches)

Mod. Deep (20 to 40 inches)

Available Water Capacity

—

Very Low (1.5 inches)

Very Low (0.5 inches)

Water Retention Class

—

3 (0.8 inches)

3 (0.5 inches)

Hydrologic Soil Group

—

A

B-C

Permeability (in./hr.)

—

Very Rapid (20+ in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

—

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

—

Moderate to High

Moderate to High

Erosion Factor (k)

—

0.10

0.05

Soil Productivity

—

Low

Low

Soil Manageability

Group

—

IV

IV

Class

—

4EPXg

4EPXg

Annual Forage Production (lb/acre)

—

200 to 600

200 to 400

Forest Survey Site Class

—

NC

6-NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Corbett family, but colder, on moraine crests, and the Stecum & Biglake families. Included areas make up approximately 25 percent of the map unit area.

353 - Wrango - Berent families - Rock outcrop association, 30 to 60 percent slopes

Elevation: 4,000 to 12,300 feet

Annual Precipitation: 4 to 30 inches

Soil Map Unit Components	Wrango family	Berent family	Rock outcrop, granitic
Approx Proportion	40 percent	20 percent	15 percent
Landscape Position	Mountainsides	Mountain Toeslopes & Depressions	Mountainsides & Ridges
Slope	30 to 60 percent	30 to 60 percent	—
Typical Vegetation	Bitterbrush	Bitterbrush	Barren

Soil Profile Description

Surface Layer	0 to 15 inches; grayish brown gravelly loamy coarse sand; single grain; loose; pH 6.8	0 to 4 inches; light yellowish brown loamy sand; weak granular structure; soft; pH 7.4	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	—	—	—
Substratum	15 to 60 inches; yellowish brown & light brown very gravelly & very cobbly coarse sand; massive; slightly hard; pH 6.8	4 to 60 inches; light yellowish brown loamy sand & sand; massive; soft; pH 7.2	—

Soil Properties

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	—
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)	—
Available Water Capacity	Very Low (1.9 inches)	Low (3.9 inches)	—
Water Retention Class	3 (1.1 inches)	3 (1.1 inches)	—
Hydrologic Soil Group	A	A-B	—
Permeability (in./hr.)	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)	—
Drainage Class	Somewhat Excessively	Somewhat Excessively	—
Max Erosion Hazard	Moderate to High	Moderate to High	—
Erosion Factor (k)	0.15	0.15	—
Soil Productivity	Low to Moderate	Low	—
Soil Manageability			
Group	IV	IV	—
Class	4EPXg	4EPXg	—
Annual Forage Production (lb/acre)	300 to 500	200 to 400	—
Forest Survey Site Class	NC	NC	—

Included Areas & Remarks

Included in this map unit are small areas of the Brantel & Kiona shallow, near rock outcrops; & Torriorthentic Haploxerolls. Included areas make up approximately 25 percent of the map unit area.

354 - Berent family - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 4,800 to 7,000 feet

Annual Precipitation: 6 to 10 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Berent family

60 percent

Hillsides

30 to 60 percent

Bitterbrush & Big Sagebrush

Rock outcrop, granitic

20 percent

Hillsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 4 inches; light yellowish brown loamy sand; weak granular structure; soft; pH 7.4

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

4 to 60 inches; light yellowish brown loamy sand & sand; massive; soft; pH 7.2

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (3.9 inches)

—

Water Retention Class

3 (1.1 inches)

—

Hydrologic Soil Group

A-B

—

Permeability (in./hr.)

Rapid (6 to 20./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.15

—

Soil Productivity

Low

—

Soil Manageability

Group

IV

—

Class

4EPXg

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Wrango & Preston families, on hillsides; & Xeric Torriorthents, shallow, near rock outcrops. Included areas make up approximately 20 percent of the map unit area.

355 - Kilburn - Nanamkin families association, 5 to 15 percent slopes

Elevation: 5,600 to 8,400 feet

Annual Precipitation: 6 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Kilburn family

50 percent

Alluvial Fan Sideslopes

5 to 15 percent

Big Sagebrush & Bitterbrush

Nanamkin family

20 percent

Alluvial Fan Ridges

5 to 15 percent

Big Sagebrush & Bitterbrush

Soil Profile Description

Surface Layer

0 to 12 inches; brown & grayish brown gravelly loamy sand & very cobbly sandy loam; weak subangular blocky structure; soft; pH 6.9

0 to 7 inches; brown very cobbly loamy sand; weak subangular blocky structure; soft; pH 7.0

Subsoil

12 to 60 inches; yellowish brown & light yellowish brown extremely cobbly coarse sandy loam; moderate subangular blocky structure; slightly hard; pH 7.0

—

Substratum

—

7 to 60 inches; yellowish brown very cobbly loamy sand; massive; soft; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.3 inches)

Very Low (2.3 inches)

Water Retention Class

3 (1.1 inches)

3 (0.8 inches)

Hydrologic Soil Group

B

A

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Well

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.15

0.05

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

III

III

Class

3Px

3Px

Annual Forage Production (lb/acre)

300 to 500

200 to 400

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Haypress family, in troughs of dissected alluvial surfaces; a soil similar to Pass Canyon, but shallow to soft bedrock; & the Springmeyer & Sur Families, on sideslopes of alluvial fans. Included areas make up approximately 30 percent of the map unit area.

356 - Kilburn - Nanamkin families association, 15 to 30 percent slopes

Elevation: 6,400 to 8,600 feet

Annual Precipitation: 10 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Kilburn family

50 percent

Alluvial Fan Sideslopes

15 to 30 percent

Big Sagebrush & Bitterbrush

Nanamkin family

20 percent

Alluvial Fan Ridges

15 to 30 percent

Big Sagebrush & Bitterbrush

Soil Profile Description

Surface Layer

0 to 12 inches; brown & grayish brown gravelly loamy sand & very cobbly sandy loam; weak subangular blocky structure; soft; pH 6.9

0 to 7 inches; brown very cobbly loamy sand; weak subangular blocky structure; soft; pH 7.0

Subsoil

12 to 60 inches; yellowish brown & light yellowish brown extremely cobbly coarse sandy loam; moderate subangular blocky structure; slightly hard; pH 7.0

—

Substratum

—

7 to 60 inches; yellowish brown very cobbly loamy sand; massive; soft; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.3 inches)

Very Low (2.3 inches)

Water Retention Class

3 (1.1 inches)

3 (0.8 inches)

Hydrologic Soil Group

B

A

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Well

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.15

0.05

Soil Productivity

Low to Moderate

Low

Soil Manageability

Group

III

III

Class

3Pex

3Pex

Annual Forage Production (lb/acre)

300 to 500

200 to 400

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Haypress family, in troughs of dissected alluvial surfaces; a soil similar to Pass Canyon, but shallow to soft bedrock; & the Springmeyer & Sur Families, on sideslopes of alluvial fans. Included areas make up approximately 30 percent of the map unit area.

357 - Jaybee family, 9 to 30 percent slopes

Elevation: 6,000 to 7,400 feet

Annual Precipitation: 8 to 14 inches

Soil Map Unit Components	Jaybee family
Approx Proportion	80 percent
Landscape Position	Dissected Basalt Flows
Slope	9 to 30 percent
Typical Vegetation	Bitterbrush & Big Sagebrush

Soil Profile Description

Surface Layer	0 to 4 inches; brown & pale brown extremely & very cobbly sandy loam; weak subangular blocky structure; soft; pH 7.1
Subsoil	4 to 15 inches; brown gravelly loam & clay loam; weak & moderate subangular blocky structure; soft to hard; pH 7.0
Substratum	15 inches; hard basalt bedrock

Soil Properties

Restrictive Layer Depth	15 to 20 inches (HB)
Effective Rooting Depth (inches)	Shallow (10 to 20 inches)
Available Water Capacity	Low (2.1 inches)
Water Retention Class	2 (2.1 inches)
Hydrologic Soil Group	B-D
Permeability (in./hr.)	Mod. Slow (0.2 to 0.6 in./hr.)
Drainage Class	Well
Max Erosion Hazard	Low to Moderate
Erosion Factor (k)	0.10
Soil Productivity	Moderate
Soil Manageability Group	II
Class	2edp
Annual Forage Production (lb/acre)	300 to 600
Forest Survey Site Class	NC

Included Areas & Remarks

Included in this map unit are small areas of the Springmeyer family & a soil similar to the Jaybee family, but with a thicker dark surface layer. Included areas make up approximately 20 percent of the map unit area.

358 - Rock outcrop - Wrango family complex, 60 to 90 percent slopes

Elevation: 5,600 to 8,100 feet

Annual Precipitation: 6 to 17 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Rock outcrop, granitic

60 percent

Mountainsides

—

Barren

Wrango Family

25 percent

Mountainsides

60 to 90 percent

Big Sagebrush

Soil Profile Description

Surface Layer

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 15 inches; grayish brown gravelly loamy coarse sand; single grain; loose; pH 6.8

Subsoil

—

—

Substratum

—

15 to 60 inches; yellowish brown & light brown very gravelly & very cobbly coarse sand; massive; slightly hard; pH 6.8

Soil Properties

Restrictive Layer Depth

—

Greater than 60 inches

Effective Rooting Depth
(inches)

—

Very Deep (> 60 inches)

Available Water Capacity

—

Very Low (1.9 inches)

Water Retention Class

—

3 (1.1 inches)

Hydrologic Soil Group

—

A

Permeability (in./hr.)

—

Rapid (6 to 20 in./hr.)

Drainage Class

—

Somewhat Excessively

Max Erosion Hazard

—

High To Very High

Erosion Factor (k)

—

0.15

Soil Productivity

—

Low

Soil Manageability

Group

—

IV

Class

—

4GEPX

Annual Forage Production
(lb/acre)

—

200 to 400

Forest Survey Site Class

—

NC

Included Areas & Remarks

Included in this map unit are small areas of Xeric Torriorthents, shallow, adjacent to rock out- croppings; & the Atter family, on toeslopes. Included areas make up approximately 15 percent the map unit area.

359 - Rock outcrop - Powment family complex, 30 to 60 percent slopes

Elevation: 6,300 to 9,300 feet

Annual Precipitation: 6 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Rock outcrop, granitic

50 percent

Mountainsides & Ridges

—

Barren

Powment family

30 percent

Mountainsides

30 to 60 percent

Big Sagebrush & Pinyon Pine

Soil Profile Description

Surface Layer

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 9 inches; grayish brown & brown very gravelly sand & loamy sand; single grain & massive; loose & soft; pH 6.6

Subsoil

—

—

Substratum

—

9 to 15 inches; pale brown very gravelly loamy sand & extremely gravelly coarse sand; massive; soft; pH 6.7

15 inches; soft decomposing granitic grus

Soil Properties

Restrictive Layer Depth

—

7 to 15 inches (PC)

Effective Rooting Depth (inches)

—

Shallow (10 to 20 inches)

Available Water Capacity

—

Very Low (0.6 inches)

Water Retention Class

—

3 (0.6 inches)

Hydrologic Soil Group

—

B-C

Permeability (in./hr.)

—

Rapid (6 to 20 in./hr.)

Drainage Class

—

Somewhat Excessively

Max Erosion Hazard

—

Moderate to High

Erosion Factor (k)

—

0.10

Soil Productivity

—

Low

Soil Manageability

Group

—

IV

Class

—

4EPXgd

Annual Forage Production (lb/acre)

—

200 to 400

Forest Survey Site Class

—

NC

Included Areas & Remarks

Included in this map unit are small areas of the Railcity, Biglake & Atter families, with the Atter family at lower elevations; & Xeric Torriorthents, shallow, at lower elevations. Included areas make up approximately 20 percent of the map unit area.

360 - Rock outcrop - Powment family complex, 60 to 90 percent slopes

Elevation: 6,300 to 11,400 feet

Annual Precipitation: 6 to 30 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Rock outcrop, granitic

50 percent

Mountainsides & Ridges

—

Barren

Powment family

30 percent

Mountainsides

60 to 90 percent

Big Sagebrush & Pinyon Pine

Soil Profile Description

Surface Layer

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 9 inches; grayish brown & brown very gravelly sand & loamy sand; single grain & massive; loose & soft; pH 6.6

Subsoil

—

—

Substratum

—

9 to 15 inches; pale brown very gravelly loamy sand & extremely gravelly coarse sand; massive; soft; pH 6.7

15 inches; soft decomposing granitic grus

Soil Properties

Restrictive Layer Depth

—

7 to 15 inches (PC)

Effective Rooting Depth (inches)

—

Shallow (10 to 20 inches)

Available Water Capacity

—

Very Low (0.6 inches)

Water Retention Class

—

3 (0.6 inches)

Hydrologic Soil Group

—

B-C

Permeability (in./hr.)

—

Rapid (6 to 20 in./hr.)

Drainage Class

—

Somewhat Excessively

Max Erosion Hazard

—

High to Very High

Erosion Factor (k)

—

0.10

Soil Productivity

—

Low

Soil Manageability

Group

—

IV

Class

—

4GEPXd

Annual Forage Production (lb/acre)

—

200 to 400

Forest Survey Site Class

—

NC

Included Areas & Remarks

Included in this map unit are small areas of the Railcity & Biglake families. Included areas make up approximately 20 percent of the map unit area.

361 - Wrango - Berent families complex, 2 to 30 percent slopes

Elevation: 5,600 to 8,400 feet

Annual Precipitation: 6 to 17 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Wrango family

40 percent

Hillsides

2 to 30 percent

Big Sagebrush & Bitterbrush

Berent family

35 percent

Hillsides

2 to 30 percent

Big Sagebrush & Saltbush

Soil Profile Description

Surface Layer

0 to 15 inches; grayish brown gravelly loamy coarse sand; single grain; loose; pH 6.8

0 to 4 inches; light yellowish brown loamy sand; weak granular structure; soft; pH 7.4

Subsoil

—

—

Substratum

15 to 60 inches; yellowish brown & light brown very gravelly & very cobbly coarse sand; massive; slightly hard; pH 6.8

4 to 60 inches; light yellowish brown loamy sand & sand; massive; soft; pH 7.2

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Very Low (1.9 inches)

Low (3.9 inches)

Water Retention Class

3 (1.1 inches)

3 (1.1 inches)

Hydrologic Soil Group

A

A-B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.15

0.15

Soil Productivity

Low

Low

Soil Manageability

Group

III

III

Class

3Pe

3Pe

Annual Forage Production (lb/acre)

200 to 400

200 to 400

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Preston family, Rock outcrop and Xeric Torri- orthents, shallow near rock outcrops. Included areas make up approximately 25 percent of the map unit area.

362 - Berent - Xeric Torriorthents complex, 30 to 60 percent slopes

Elevation: 4,100 to 8,000 feet

Annual Precipitation: 4 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Berent family

35 percent

Mountainsides & Alluvial Fans

30 to 60 percent

Big Sagebrush

Xeric Torriorthents

30 percent

Mountainsides

30 to 60 percent

Blackbrush

Soil Profile Description

Surface Layer

0 to 4 inches; light yellowish brown loamy sand;
weak granular structure; soft; pH 7.40 to 10 inches; pale brown & yellowish brown very
gravelly loamy coarse sand; weak subangular blocky &
massive structure; slightly hard; pH 7.2

Subsoil

—

—

Substratum

4 to 60 inches; light yellowish brown loamy sand;
massive; soft; pH 7.2

10 inches; soft weathering granitic bedrock

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

9 to 12 inches (FB)

Effective Rooting Depth
(inches)

Very Deep (> 60 inches)

Shallow (10 to 20 inches)

Available Water Capacity

Low (3.9 inches)

Very Low (0.3 inches)

Water Retention Class

3 (1.1 inches)

3 (0.3 inches)

Hydrologic Soil Group

A-B

C-D

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Moderate to High

Moderate to High

Erosion Factor (k)

0.15

0.10

Soil Productivity

Low

Very Low

Soil Manageability

Group

IV

IV

Class

4EPgx

4EPDXg

Annual Forage Production
(lb/acre)

200 to 400

< 200

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Calpine family, but without a dark surface layer; a soil similar to the Abgese family, but with a coarser texture; the Wrango and Kiona families & granitic Rock outcrops. Included areas make up approximately 35 percent of the map unit area.

363 - Garlet - Cowood families - Rock outcrop association, 15 to 60 percent slopes

Elevation: 10,000 to 11,000 feet Annual Precipitation: 20 to 25 inches

Soil Map Unit Components	Garlet family	Cowood family	Rock outcrop, granitic
Approx Proportion	50 percent	20 percent	15 percent
Landscape Position	Moraines & Lower Mountainsides	Upper Mountainsides & Ridges	Mountainsides & Ridges
Slope	15 to 60 percent	15 to 60 percent	—
Typical Vegetation	Big Sagebrush	Mountain Mahogany & Sagebrush	Barren

Soil Profile Description

Surface Layer	0 to 6 inches; brown gravelly sandy loam; weak subangular blocky structure; soft; pH 6.7	0 to 5 inches; dark grayish brown extremely stony loamy coarse sand & sandy loam; single grain & weak subangular blocky structure; loose & soft; pH 6.4	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	6 to 14 inches; yellowish brown very gravelly sandy loam; weak subangular blocky structure; slightly hard; pH 6.9	5 to 11 inches; yellowish brown extremely stony sandy loam; moderate subangular blocky structure; soft; pH 6.3	—
Substratum	14 to 24 inches; yellowish brown very gravelly coarse sandy loam; massive; soft; pH 6.8	11 inches; hard granitic bedrock	—
	24 inches; hard granite bedrock		

Soil Properties

Restrictive Layer Depth	24 inches (HB)	11 inches (HB)	—
Effective Rooting Depth (inches)	Mod. Deep (20 to 40 inches)	Shallow (10 to 20 inches)	—
Available Water Capacity	Very Low (1.9 inches)	Very Low (0.3 inches)	—
Water Retention Class	3 (0.8 inches)	3 (0.3 inches)	—
Hydrologic Soil Group	B-C	C-D	—
Permeability (in./hr.)	Mod. Rapid (2 to 6 in./hr.)	Mod. Rapid (2 to 6 in./hr.)	—
Drainage Class	Well	Well	—
Max Erosion Hazard	Low to High	Low to High	—
Erosion Factor (k)	0.15	0.05	—
Soil Productivity	Low	Low	—
Soil Manageability Group	IV	IV	—
Class	4EPXg	4EPXgd	—
Annual Forage Production (lb/acre)	200 to 400	200 to 400	—
Forest Survey Site Class	NC	NC	—

Included Areas & Remarks

Included in this map unit are small areas of Lithic Cryorthents & the Salt Chuck family, on upper mountainsides & ridges. Included areas make up approximately 15 percent of the map unit area.

364 - Preston family - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 6,600 to 7,800 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Preston family

55 percent

Hillsides

30 to 60 percent

Big Sagebrush & Bitterbrush

Rock outcrop, granitic

15 percent

Hillsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 2 inches; dark grayish brown cobbly loamy sand; weak granular structure; soft; pH 6.7

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

2 to 60 inches; pale brown & light brownish gray loamy sand; weak subangular blocky & massive structure; soft & slightly hard; pH 6.6

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (3.9 inches)

—

Water Retention Class

2 (1.3 inches)

—

Hydrologic Soil Group

A-B

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Moderate to High

—

Erosion Factor (k)

0.22

—

Soil Productivity

Low to Moderate

—

Soil Manageability

Group

III

—

Class

3Egpx

—

Annual Forage Production (lb/acre)

200 to 500

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Preston family, but shallow to a paralithic contact; & the Waterman, Haypress & Atter families. Included areas make up approximately 30 percent of the map unit area.

365 - Stecum - Garlet families association, 5 to 30 percent slopes

Elevation: 8,600 to 11,300 feet

Annual Precipitation: 20 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Stecum family

40 percent

Moraines & Moraine Crests

5 to 30 percent

Big Sagebrush & Bitterbrush

Garlet family

30 percent

Hillsides

5 to 30 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5

0 to 6 inches; brown gravelly sandy loam; weak subangular blocky structure; soft; pH 6.7

Subsoil

9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5

6 to 14 inches; yellowish brown very gravelly sandy loam; weak subangular blocky structure; slightly hard; pH 6.9

Substratum

24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; soft; pH 5.5

14 to 24 inches; yellowish brown very gravelly coarse sandy loam; massive; soft; pH 6.8

24 inches; hard granite bedrock

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

24 inches (HB)

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Shallow (10 to 20 inches)

Available Water Capacity

Very Low (2.0 inches)

Very Low (1.9 inches)

Water Retention Class

3 (0.8 inches)

3 (0.8 inches)

Hydrologic Soil Group

A

B-C

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Somewhat Excessively

Well

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.10

0.15

Soil Productivity

Low

Low

Soil Manageability

Group

III

III

Class

3Pex

3Pex

Annual Forage Production (lb/acre)

200 to 500

200 to 400

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Charcol family, but with less rock fragments, on moraines; the Salt Chuck & Cowood families, on hillsides; & Lithic Cry- orthents, on moraines. Included areas make up approximately 30 percent of the map unit area.

366 - Stecum family - Rock outcrop complex, 2 to 30 percent slopes

Elevation: 8,800 to 10,600 feet

Annual Precipitation: 20 to 30 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Stecum family

60 percent

Moraines Sideslopes & Glacial Terraces

2 to 30 percent

Lodgepole Pine & Bitterbrush

Rock outcrop, granitic

15 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5

—

Substratum

24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; soft; pH 5.5

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Very Low (2.0 inches)

—

Water Retention Class

3 (0.8 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.10

—

Soil Productivity

Low

—

Soil Manageability

Group

IV

—

Class

4PXe

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

7-NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Charcol, Cowood & Guiser families, on terraces and benches; the Garlet family & Lithic Cryorthents, on moraines and mountainsides. Included areas make up approximately 25 percent of the map unit area.

367 - Stecum family - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 8,800 to 12,700 feet

Annual Precipitation: 20 to 30 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Stecum family

50 percent

Moraines Sideslopes & Mountainsides

30 to 60 percent

Lodgepole Pine & Bitterbrush

Rock outcrop, granitic

20 percent

Mountainsides & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5

—

Substratum

24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; soft; pH 5.5

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Very Low (2.0 inches)

—

Water Retention Class

3 (0.8 inches)

—

Hydrologic Soil Group

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

—

Max Erosion Hazard

Moderate to High

—

Erosion Factor (k)

0.10

—

Soil Productivity

Low

—

Soil Manageability

Group

IV

—

Class

4EPXg

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Biglake family, on lateral moraines with mountain mahogany; the Nanamkin, Powment, Garlet, Salt Chuck families & Lithic Cryorthents, on moraines and mountainsides. Included areas make up approximately 30 percent of the map unit area.

368 - Bearskin - Mascamp families complex, 15 to 30 percent slopes

Elevation: 7,600 to 9,300 feet

Annual Precipitation: 12 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Bearskin family

40 percent

Hillsides

15 to 30 percent

Big Sagebrush

Mascamp family

35 percent

Hillsides & Knolltops

15 to 30 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 2 inches; brown gravelly loamy fine sand; weak granular structure; soft; pH 6.4

0 to 7 inches; brown extremely & very cobbly sandy loam; weak subangular blocky structure; soft; pH 6.3

Subsoil

2 to 10 inches; grayish brown & brown gravelly sandy loam; moderate subangular blocky structure; slightly hard pH 6.5

7 to 19 inches; dark yellowish brown very cobbly sandy loam; weak & moderate subangular structure; slightly hard pH 6.0

Substratum

10 inches; hard sedimentary bedrock

19 inches; hard granitic bedrock

Soil Properties

Restrictive Layer Depth

10 to 20 inches (HB)

9 to 19 inches (HB)

Effective Rooting Depth (inches)

Shallow (10 to 20 inches)

Shallow (10 to 20 inches)

Available Water Capacity

Very Low (0.8 inches)

Very Low (1.0 inches)

Water Retention Class

3 (0.8 inches)

3 (1.0 inches)

Hydrologic Soil Group

C-D

B-C

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Well

Well

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.17

0.15

Soil Productivity

Low to Moderate

Low to Moderate

Soil Manageability

Group

III

III

Class

3Ped

3Ped

Annual Forage Production (lb/acre)

300 to 600

300 to 600

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Sumine, Nanamkin & Powment families, near rock outcrops, & the Jaybee family, at lower elevations, near rock outcrops. Included areas make up approximately 25 percent of the map unit area.

**369 - Rock outcrop - Lithic Cryorthents - Nanamkin family association,
15 to 60 percent slopes**

Elevation: 5,000 to 13,000 feet Annual Precipitation: 6 to 30 inches

Soil Map Unit Components
Approx Proportion
Landscape Position
Slope
Typical Vegetation

Rock outcrop, granitic	Lithic Cryorthents	Nanamkin family
30 percent	20 percent	15 percent
Mountainsides & Ridges	Mid to Upper Mountainsides	Lower Mountainsides
—	15 to 60 percent	15 to 60 percent
Barren	Big Sagebrush & Lodgepole Pine	Bitterbrush & Big Sagebrush

Soil Profile Description

Surface Layer

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.	0 to 2 inches; pale brown extremely stony loamy sand; single grain; loose; pH 6.0	0 to 7 inches; brown very cobbly loamy sand; weak subangular blocky structure; soft; pH 7.0
---	---	---

Subsoil

—	—	—
---	---	---

Substratum

—	2 to 18 inches; pale brown very stony loamy sand; massive; soft; pH 6.4	7 to 60 inches; yellowish brown very cobbly loamy sand; massive; soft; pH 7.0
	18 inches; hard granitic bedrock	

Soil Properties

Restrictive Layer Depth	—	16 to 18 inches (HB)	Greater than 60 inches
Effective Rooting Depth (inches)	—	Shallow (10 to 20 inches)	Deep (> 60 inches)
Available Water Capacity	—	Very Low (2.0 inches)	Very Low (2.3 inches)
Water Retention Class	—	3 (0.7 inches)	3 (0.8 inches)
Hydrologic Soil Group	—	B-C	A
Permeability (in./hr.)	—	Rapid (6 to 20 in./hr.)	Rapid (6 to 20 in./hr.)
Drainage Class	—	Somewhat Excessively	Somewhat Excessively
Max Erosion Hazard	—	Low to High	Low to High
Erosion Factor (k)	—	0.05	0.05
Soil Productivity	—	Low	Low
Soil Manageability Group	—	IV	IV
Class	—	4EPXgd	4EPXg
Annual Forage Production (lb/acre)	—	200 to 400	200 to 400
Forest Survey Site Class	—	7-NC	NC

Included Areas & Remarks

Included in this map unit are small areas of the Stecum & Salt Chuck families, on mid to upper mountainsides; & the Railcity, Chesaw, Corbett & Powment families, on lower mountainsides Included areas make up approximately 35 percent of the map unit area.

370 - Kiona family - Rock outcrop complex, 5 to 30 percent slopes

Elevation: 4,000 to 9,000 feet

Annual Precipitation: 4 to 20 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Kiona family

35 percent

Basalt Flows & Terraces

5 to 30 percent

Big Sagebrush

Rock outcrop, basalt & sandstone

35 percent

Basalt Flows & Ridges

—

Barren

Soil Profile Description

Surface Layer

0 to 4 inches; light yellowish brown extremely stony sandy loam; weak platy structure; soft; pH 7.0

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

4 to 35 inches; brown & pale brown very gravelly & extremely cobbly sandy loam; moderate subangular blocky structure; slightly hard; pH 7.0

—

Substratum

35 to 65 inches; pale brown & yellowish brown gravelly loamy sand, loamy sand & very cobbly sandy loam; massive; pH 7.0

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (2.8 inches)

—

Water Retention Class

3 (0.8 inches)

—

Hydrologic Soil Group

B

—

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

—

Drainage Class

Well

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.15

—

Soil Productivity

Moderate

—

Soil Manageability

Group

IV

—

Class

4PXe

—

Annual Forage Production (lb/acre)

300 to 600

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Sur & Wrango families, on basalt flows and the Calpine family & Torriorthentic Haploxerolls, on terraces. Included areas make up approximately 30 percent of the map unit area.

371 - Labshaft - Salt Chuck families - Rock outcrop complex, 15 to 60 percent slopes

Elevation: 10,000 to 12,300 feet Annual Precipitation: 20 to 30 inches

Soil Map Unit Components	Labshaft family	Salt Chuck family	Rock outcrop, granitic
Approx Proportion	30 percent	30 percent	15 percent
Landscape Position	Mountainsides & Hillsides	Mountainsides & Hillsides	Mountainsides
Slope	15 to 60 percent	15 to 60 percent	—
Typical Vegetation	Sagebrush & Bitterbrush	Big Sagebrush & Bitterbrush	Barren

Soil Profile Description

Surface Layer	0 to 2 inches; grayish brown very gravelly sandy loam; weak subangular blocky structure; soft; pH 6.8	0 to 14 inches; dark grayish brown & brown extremely stony loamy sand; single grain; loose; pH 5.9	Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.
Subsoil	2 to 13 inches; brown & grayish brown very gravelly sandy loam; weak subangular blocky structure; soft; pH 6.9	—	—
Substratum	13 inches; hard granitic bedrock	14 to 33 inches; light yellowish brown & light gray very gravelly & extremely stony loamy sand; massive; slightly hard; pH 6.1 33 inches; soft decomposing granitic bedrock	—

Soil Properties

Restrictive Layer Depth	10 to 20 inches (HB)	33 inches (FB)	—
Effective Rooting Depth (inches)	Shallow (10 to 20 inches)	Mod. Deep (20 to 40 inches)	—
Available Water Capacity	Very Low (0.9 inches)	Very Low (0.5 inches)	—
Water Retention Class	3 (0.9 inches)	3 (0.5 inches)	—
Hydrologic Soil Group	B-C	B-C	—
Permeability (in./hr.)	Mod. Rapid (2 to 6 in./hr.)	Rapid (6 to 20 in./hr.)	—
Drainage Class	Well	Somewhat Excessively	—
Max Erosion Hazard	Low to high	Low to High	—
Erosion Factor (k)	0.18	0.05	—
Soil Productivity	Low to Moderate	Low	—
Soil Manageability			
Group	IV	IV	—
Class	4EPXgd	4EPXg	—
Annual Forage Production (lb/acre)	300 to 800	200 to 400	—
Forest Survey Site Class	NC	NC	—

Included Areas & Remarks

Included in this map unit are small areas of the Garlet & Cowood Lithic Cryorthents. Included areas make up approximately 25 percent of the map unit area.

372 - Powment - Nanamkin families - Rock outcrop association, 30 to 60 percent slopes

Elevation: 5,200 to 10,600 feet Annual Precipitation: 6 to 30 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Powment family

25 percent

Mountainsides & Ridges

30 to 60 percent

Pinyon Pine & Mtn Mahogany

Nanamkin family

25 percent

Mountainsides & Toeslopes

30 to 60 percent

Mountain Mahogany &
Sagebrush**Rock outcrop, granitic**

25 percent

Mountain Ridges & Crests

—

Barren

Soil Profile Description

Surface Layer

0 to 9 inches; grayish brown &
brown very gravelly sand & loamy
sand; single grain & massive;
loose & soft; pH 6.60 to 7 inches; brown very cobbly
loamy sand; weak subangular
blocky structure; soft; pH 7.0Rock outcrop consists of
continuous bare bedrock & less
than 15 percent inclusions of soil
material capable of supporting
plants.

Subsoil

—

—

—

Substratum

9 to 15 inches; pale brown very
gravelly loamy sand & extremely
gravelly coarse sand; massive;
soft; pH 6.77 to 60 inches; yellowish brown
very cobbly loamy sand;
massive; soft; pH 7.0

—

15 inches; soft decomposing
granitic grus**Soil Properties**

Restrictive Layer Depth

7 to 15 inches (PC)

Greater than 60 inches

—

Effective Rooting Depth
(inches)

Shallow (10 to 20 inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Very Low (0.6 inches)

Very Low (2.3 inches)

—

Water Retention Class

3 (0.6 inches)

3 (0.8 inches)

—

Hydrologic Soil Group

B-C

A

—

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

—

Drainage Class

Somewhat Excessively

Somewhat Excessively

—

Max Erosion Hazard

Moderate to High

Moderate to High

—

Erosion Factor (k)

0.10

0.05

—

Soil Productivity

Low

Low

—

Soil Manageability

Group

IV

IV

—

Class

4EPXgd

4EPXg

—

Annual Forage Production
(lb/acre)

200 to 400

200 to 400

—

Forest Survey Site Class

NC

NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Waterman family, on fans, in drainages & on terraces; a soil similar to the Bearskin family, but shallow to soft bedrock, & with less clay; a soil similar to the Waterman family, but with fewer coarse fragments, & shallow to soft bedrock, rock outcrops; a soil similar to the Waterman family, but with a cooler soil temperature regime, near rock outcrops. Included areas make up approximately 25 percent of the map unit area.

373 - Labshaft family - Rock outcrop complex, 30 to 60 percent slopes

Elevation: 9,600 to 11,300 feet

Annual Precipitation: 20 to 30 inches

Soil Map Unit Components

Labshaft family

Rock outcrop, granitic & metamorphic

Approx Proportion

60 percent

15 percent

Landscape Position

Mountainsides

Mountainsides & Ridges

Slope

30 to 60 percent

—

Typical Vegetation

Sagebrush

Barren

Soil Profile Description

Surface Layer

0 to 2 inches; grayish brown very gravelly sandy loam; weak subangular blocky structure; soft; pH 6.8

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

2 to 13 inches; brown & grayish brown very gravelly sandy loam; weak subangular blocky structure; soft; pH 6.9

—

Substratum

13 inches; hard granitic bedrock

—

Soil Properties

Restrictive Layer Depth

10 to 20 inches (HB)

—

Effective Rooting Depth (inches)

Shallow (10 to 20 inches)

—

Available Water Capacity

Very Low (0.9 inches)

—

Water Retention Class

3 (0.9 inches)

—

Hydrologic Soil Group

B-C

—

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

—

Drainage Class

Well

—

Max Erosion Hazard

Moderate to High

—

Erosion Factor (k)

0.18

—

Soil Productivity

Low to Moderate

—

Soil Manageability

Group

IV

—

Class

4EPXgd

—

Annual Forage Production (lb/acre)

300 to 800

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Charcol, Cowood, Garlet & Biglake families & Lithic Cryorthents. Included areas make up approximately 25 percent of the map unit area.

374 - Aquic Haploxerolls, 0 to 9 percent slopes

Elevation: 7,200 to 8,800 feet

Annual Precipitation: 13 to 18 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Aquic Haploxerolls

65 percent

Meadows

0 to 9 percent

Perennial Grasses

Soil Profile Description

Surface Layer

3 to 0 inches; grass litter & a thick matting of grass roots

0 to 28 inches; gray gravelly loamy sand; massive; slightly hard; pH 6.5

Subsoil

—

Substratum

28 to 60 inches; brown gravelly loamy coarse sand; single grain; loose; pH 6.7

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.7 inches)

Water Retention Class

3 (1.2 inches)

Hydrologic Soil Group

B-C

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Poorly

Max Erosion Hazard

Low to High

Erosion Factor (k)

0.10

Soil Productivity

Low to High

Soil Manageability

Group

IV

Class

4EPW

Annual Forage Production (lb/acre)

300 to 1,500

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Brantel family, on outer fringes of meadows; Aquic Cryoborolls, at higher elevations; and Vitrandic Xerofluvents, on outer fringes of meadows, at lower elevations. Meadow system streams may be incised, which would lower the watertable and reduce the abundance of sedges and grasses, which in turn may increase the erosion hazard rating from low to high. Included areas make up approximately 35 percent of the map unit area.

375 - Deepwell family - Vitrandic Torripsamments association, 2 to 30 percent slopes

Elevation: 6,400 to 6,600 feet

Annual Precipitation: 6 to 10 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Deepwell family

50 percent

Sand Dunes & Basin Floors

2 to 30 percent

Saltbush

Vitrandic Torripsamments

25 percent

Interdune areas on Lake Terraces

2 to 30 percent

Saltbush

Soil Profile Description

Surface Layer

—

0 to 28 inches; light brownish gray & very pale brown gravelly coarse sand & gravelly sand; single grain & massive; loose & slightly hard; pH 6.8 to 7.2

Subsoil

—

—

Substratum

0 to 60 inches; light gray sand; single grain; loose; pH 7.6

28 to 60 inches; very pale brown coarse sand; massive; slightly hard; pH 7.8

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (4.2 inches)

Low (3.8 inches)

Water Retention Class

2 (1.4 inches)

3 (1.0 inches)

Hydrologic Soil Group

A

A

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.15

0.10

Soil Productivity

Very Low

Low

Soil Manageability

Group

II

III

Class

2ep

3Pe

Annual Forage Production (lb/acre)

< 300

200 to 400

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Berent & Preston families. Included areas make up approximately 25 percent of the map unit area.

376 - Playa

Elevation: 6,300 to 6,400 feet

Annual Precipitation: 6 to 8 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Playa

100 percent

Basin Floors

—

Barren

Soil Profile Description

Surface Layer

Consists of ephemerally flooded, vegetatively barren area, with a fine-textured surface layer which acts as a temporary sink for drainage water.

Subsoil

—

Substratum

—

Soil Properties

Restrictive Layer Depth

—

Effective Rooting Depth
(inches)

—

Available Water Capacity

—

Water Retention Class

—

Hydrologic Soil Group

—

Permeability (in./hr.)

—

Drainage Class

—

Max Erosion Hazard

—

Erosion Factor (k)

—

Soil Productivity

—

Soil Manageability

Group

—

Class

—

Annual Forage Production
(lb/acre)

—

Forest Survey Site Class

—

Included Areas & Remarks

—

377 - Sonoma - Poole families complex, 0 to 2 percent slopes

Elevation: 6,300 to 6,600 feet

Annual Precipitation: 6 to 10 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Sonoma family

60 percent

Lake Terraces

0 to 2 percent

Pickleweed & Sedges

Poole family

25 percent

Lake Terraces

0 to 2 percent

Pickleweed & Sedges

Soil Profile Description

Surface Layer

0 to 22 inches; very pale brown & light gray sand & silt loam; weak subangular blocky & massive structure; soft & slightly hard; pH 8.5+

0 to 15 inches; light gray & gray sandy loam & silty clay loam; strong platy & strong subangular blocky structure; slightly hard & hard; pH 9.6

Subsoil

—

—

Substratum

22 to 60 inches; light gray & light yellowish brown silty clay loam & fine sand; massive; soft; pH 8.0 to 8.5+

15 to 60 inches; light gray silty clay loam; strong prismatic structure; very hard; pH 9.6

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

High (8.9 inches)

High (9.5 inches)

Water Retention Class

2 (2.1 inches)

1 (3.1 inches)

Hydrologic Soil Group

D

D

Permeability (in./hr.)

Mod. Slow (0.2 to 0.6 in./hr.)

Mod. Slow (0.2 to 0.6 in./hr.)

Drainage Class

Poorly to Very Poorly

Poorly to Very Poorly

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.15

0.32

Soil Productivity

Low to High

Low to High

Soil Manageability

Group

III

III

Class

3Wp

3W

Annual Forage Production (lb/acre)

200 to 1,000

200 to 1,000

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Orecart & Dechambeau families, & Aeric Endoaquents. Included areas make up approximately 15 percent of the map unit area.

378 - Dechambeau - Orecart families complex, 1 to 15 percent slopes

Elevation: 6,300 to 6,900 feet

Annual Precipitation: 6 to 10 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Dechambeau family

55 percent

Alluvial Fans & Lake Terraces

1 to 15 percent

Big Sagebrush

Orecart family

35 percent

Interdune areas on Lake Terraces

1 to 15 percent

Big Sagebrush & Bitterbrush

Soil Profile Description

Surface Layer

0 to 7 inches; light brownish gray gravelly sandy loam; weak thick platy & weak granular structure; soft; pH 6.4

0 to 4 inches; white loamy sand; strong very thick & thick platy structure; soft; pH 8.5

Subsoil

—

4 to 25 inches; pale brown & light grayish brown loamy sand; massive; soft & brittle; pH 8.5

Substratum

7 to 60 inches; brown & yellowish brown gravelly sandy loam; massive; slightly hard; pH 6.6

25 to 60 inches; light gray loamy sand; massive; soft & brittle; pH 8.5

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.6 inches)

Moderate (4.6 inches)

Water Retention Class

2 (1.9 inches)

2 (1.4 inches)

Hydrologic Soil Group

B

B

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Moderate (0.6 to 2 in./hr.)

Drainage Class

Well

Well

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.24

0.20

Soil Productivity

Moderate

Very Low

Soil Manageability

Group

II

II

Class

2p

2p

Annual Forage Production (lb/acre)

400 to 800

< 300

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Deepwell & Brantel families, & Xerofluvents. Included areas make up approximately 10 percent of the map unit area.

379 - Alamedawell - Deepwell families complex, 2 to 15 percent slopes

Elevation: 6,400 to 6,700 feet

Annual Precipitation: 6 to 10 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Alamedawell family

60 percent

Interdunes

2 to 9 percent

Big Sagebrush

Deepwell family

20 percent

Stabilized Sand Dunes & Sandy Ridges on Basin Floors

9 to 15 percent

Shadscale

Soil Profile Description

Surface Layer

0 to 3 inches; light gray loamy sand; single grain; loose; pH 8.2

—

Subsoil

—

—

Substratum

3 to 60 inches; light gray sand, loamy sand & silt loam; massive; soft; pH 8.8

0 to 60 inches; light gray sand; single grain; loose; pH 7.6

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (7.2 inches)

Moderate (4.2 inches)

Water Retention Class

2 (1.3 inches)

2 (1.4 inches)

Hydrologic Soil Group

B-C

A

Permeability (in./hr.)

Mod. Slow (0.2 to 0.6 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.20

0.15

Soil Productivity

Very Low

Very Low

Soil Manageability

Group

II

II

Class

2p

2p

Annual Forage Production (lb/acre)

< 300

< 300

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Brantel & Deepwell families. Included areas make up approximately 20 percent of the map unit area.

380 - Vitrandic Torriorthents, ashy - Vitrandic Haplodurids complex, 0 to 2 percent slopes

Elevation: 6,300 to 6,600 feet

Annual Precipitation: 6 to 10 inches

Soil Map Unit Components**Approx Proportion****Landscape Position****Slope****Typical Vegetation****Vitrandic Torriorthents, ashy**

60 percent

Old Lake Beaches

0 to 2 percent

Shadscale & Saltbush

Vitrandic Haplodurids

20 percent

Old Lake Beaches

0 to 2 percent

Shadscale & Saltbush

Soil Profile Description**Surface Layer**

0 to 12 inches; light gray & pale yellow sand; single grain & massive; loose & slightly hard; pH 8.0

0 to 4 inches; light gray sand; single grain; loose; pH 8.0

Subsoil

—

4 to 10 inches; light yellowish brown gravelly coarse sand; massive; soft; pH 8.0

Substratum

12 to 60 inches; light gray & grayish brown stratified silt & fine sandy loam, sand, gravelly sand & coarse sand; massive; slightly hard; pH 8.0 to 8.5

10 inches; extremely hard lime-silica duripan

Soil Properties**Restrictive Layer Depth**

Greater than 60 inches

10 inches (DP)

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Shallow (10 to 20 inches)

Available Water Capacity

Moderate (4.3 inches)

Very Low (0.50 inches)

Water Retention Class

2 (1.8 inches)

3 (0.50 inches)

Hydrologic Soil Group

A-B

C-D

Permeability (in./hr.)

Moderate (0.6 to 2 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Poorly to Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.15

0.15

Soil Productivity

Low to Moderate

Low

Soil Manageability**Group**

II

IV

Class

2p

4DPw

Annual Forage Production (lb/acre)

200 to 600

200 to 400

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Brantel & Deepwell families. Included areas make up approximately 20 percent of the map unit area.

381 - Poole family - Aeric Endoaquents complex, 0 to 2 percent slopes

Elevation: 6,300 to 6,600 feet

Annual Precipitation: 6 to 10 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Poole family

50 percent

Lake Terraces

0 to 2 percent

Pickleweed & Sedges

Aeric Endoaquents

35 percent

Lake Terraces

0 to 2 percent

Pickleweed & Sedges

Soil Profile Description

Surface Layer

0 to 15 inches; light gray & gray sandy loam & silty clay loam; strong platy & strong subangular blocky structure; slightly hard, hard; pH 9.6

0 to 3 inches; light olive gray sandy loam; weak platy structure to massive; slightly hard; pH 8.4

Subsoil

—

—

Substratum

15 to 60 inches; light gray silty clay loam; strong prismatic structure; very hard; pH 9.6

3 to 60 inches; light olive gray, pale olive & light gray coarse sandy loam, silty clay loam & silt loam; massive; slightly hard; pH 9.0 to 9.4

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

High (9.5 inches)

High (9.4 inches)

Water Retention Class

1 (3.1 inches)

1 (2.6 inches)

Hydrologic Soil Group

D

D

Permeability (in./hr.)

Mod. Slow (0.2 to 0.6 in./hr.)

Slow (0.06 to 0.20 in./hr.)

Drainage Class

Poorly to Very Poorly

Poorly

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.32

0.32

Soil Productivity

Low to High

Low to High

Soil Manageability

Group

III

III

Class

3W

3W

Annual Forage Production (lb/acre)

200 to 1,000

200 to 1,200

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Orecart & Dechambeau families. Included areas make up approximately 15 percent of the map unit area.

382 - Brantel - Poole families complex, 0 to 5 percent slopes

Elevation: 6,300 to 6,600 feet

Annual Precipitation: 6 to 10 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Brantel family

50 percent

Higher Positions on Lake Terraces

0 to 5 percent

Big Sagebrush

Poole family

25 percent

Lower Positions on Lake Terraces

0 to 2 percent

Pickleweed & Sedges

Soil Profile Description

Surface Layer

0 to 9 inches; light brownish gray and light gray coarse sand & gravelly loamy coarse sand; massive; soft; pH 5.0

0 to 15 inches; light gray & gray sandy loam & silty clay loam; strong platy & strong subangular blocky structure; slightly hard, hard; pH 9.6

Subsoil

—

—

Substratum

9 to 60 inches; white, light gray, dark gray & black gravelly coarse sand & loamy coarse sand & gravel; massive, single grain & platy structure; soft; pH 5.5 to 7.2

15 to 60 inches; light gray silty clay loam; strong prismatic structure; very hard; pH 9.6

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Deep (40 to 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.4 inches)

High (9.5 inches)

Water Retention Class

3 (0.9 inches)

1 (3.1 inches)

Hydrologic Soil Group

B

D

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Mod. Slow (0.2 to 0.6 in./hr.)

Drainage Class

Somewhat Excessively

Poorly to Very Poorly

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.10

0.32

Soil Productivity

Low

Low to High

Soil Manageability

Group

III

III

Class

3P

3W

Annual Forage Production (lb/acre)

200 to 400

200 to 1,000

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Orecart & Dechambeau families, & Aeric Endoaquents. Included areas make up approximately 25 percent of the map unit area.

383 - Orecart - Deepwell families association, 2 to 15 percent slopes

Elevation: 6,300 to 6,800 feet

Annual Precipitation: 6 to 10 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Orecart family

50 percent

Interdune areas on Lake Terraces

2 to 15 percent

Big Sagebrush & Bitterbrush

Deepwell family

30 percent

Stabilized Sand Dunes & Sandy Ridges on lake Terraces

2 to 15 percent

Big Sagebrush & Bitterbrush

Soil Profile Description

Surface Layer

0 to 4 inches; white loamy sand; strong very thick & thick platy structure; soft; pH 8.5

—

Subsoil

4 to 25 inches; pale brown & light grayish brown loamy sand; massive; soft & brittle; pH 8.5

—

Substratum

25 to 60 inches; light gray loamy sand; massive; soft & brittle; pH 8.5

0 to 60 inches; light gray sand; single grain; loose; pH 7.6

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (4.6 inches)

Moderate (4.2 inches)

Water Retention Class

2 (1.4 inches)

2 (1.4 inches)

Hydrologic Soil Group

B

A

Permeability (in./hr.)

Moderate (0.6 to 2 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Well

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.20

0.15

Soil Productivity

Very Low

Very Low

Soil Manageability

Group

II

II

Class

2p

2p

Annual Forage Production (lb/acre)

< 300

< 300

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Dechambeau & Brantel families, & Xerofluvents. Included areas make up approximately 20 percent of the map unit area.

384 - Cumulic Haploxerolls - Typic Fluvaquents association, 0 to 9 percent slopes

Elevation: 6,300 to 6,600 feet

Annual Precipitation: 6 to 10 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Cumulic Haploxerolls

40 percent

Mounds in Drainage Bottoms

0 to 9 percent

Sedge-Rush

Typic Fluvaquents

30 percent

Intermounds in Drainage Bottoms

0 to 2 percent

Sedge-Rush

Soil Profile Description

Surface Layer

0 to 4 inches; gray loam; massive to weak granular structure; hard; pH 7.1

0 to 10 inches; grayish brown & light grayish brown loam & gravelly loamy sand; moderate granular, massive & single grain structure; soft & slightly hard; pH 8.2 to 8.4

Subsoil

—

—

Substratum

4 to 60 inches; gray loam, silty clay loam or clay loam; medium subangular blocky structure; hard; pH 7.2

10 to 60 inches; light gray, light brownish gray, grayish brown & dark brown silty clay loam, loam, sandy loam & loamy sand; massive; loose & hard; pH 8.2 to 8.4

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

High (10.9 inches)

High (9.4 inches)

Water Retention Class

1 (3.3 inches)

1 (2.5 inches)

Hydrologic Soil Group

C-D

C-D

Permeability (in./hr.)

Mod. Slow (0.2 to 0.6 in./hr.)

Mod. Slow (0.2 to 0.6 in./hr.)

Drainage Class

Somewhat Poorly to Poorly

Poorly

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.37

0.37

Soil Productivity

Moderate to High

Low to High

Soil Manageability

Group

III

III

Class

3W

3W

Annual Forage Production (lb/acre)

500 to 1,800

200 to 1,500

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Brantel, Dechambeau, Deepwell & Orecart families; on sandy and other well or somewhat excessively drained areas; the Poole family & Aeric Endoaquents; on somewhat poorly or poorly drained areas. Included areas make up approximately 30 percent of the map unit area.

385 - Vitrandic Torriorthents, sodic, 0 to 9 percent slopes

Elevation: 6,200 to 6,900 feet

Annual Precipitation: 6 to 10 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Vitrandic Torriorthents, sodic

80 percent

Lake Terraces

0 to 9 percent

Shadscale & Saltbush

Soil Profile Description

Surface Layer

0 to 23 inches; light brownish gray silty clay loam; strong platy structure & prismatic structure; slightly hard & hard; pH 8.8 to 10.8

Subsoil

—

Substratum

23 to 60 inches; white sand & light brownish gray silty clay loam; single grain & strong prismatic structure; loose & hard; pH 8.0 to 9.7

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

High (8.8 inches)

Water Retention Class

1 (3.2 inches)

Hydrologic Soil Group

C-D

Permeability (in./hr.)

Mod. Slow (0.2 to 0.6 in./hr.)

Drainage Class

Well

Max Erosion Hazard

Low

Erosion Factor (k)

0.37

Soil Productivity

Low to Moderate

Soil Manageability

Group

I

Class

-

Annual Forage Production (lb/acre)

200 to 800

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Alamedwell, Brantel & Deepwell families. Included areas make up approximately 20 percent of the map unit area. Additional limitations may exist due to the very high pH (9.7 to 10.8).

386 - Avalmount family - Rock outcrop complex, 5 to 30 percent slopes

Elevation: 6,400 to 6,700 feet

Annual Precipitation: 6 to 10 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Avalmount family

65 percent

Basalt Flows & along Creeks

5 to 30 percent

Big Sagebrush

Rock outcrop, basalt

15 percent

Protrusions in Basalt Flows

—

Barren

Soil Profile Description

Surface Layer

0 to 10 inches; brown very gravelly fine sandy loam; weak subangular blocky structure; soft; pH 7.3

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

10 to 60 inches; yellowish & dark yellowish brown very cobbly loam & extremely stony very fine sandy loam; weak subangular blocky structure; hard, slightly hard; pH 7.1

—

Substratum

—

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (3.6 inches)

—

Water Retention Class

2 (1.4 inches)

—

Hydrologic Soil Group

A-B

—

Permeability (in./hr.)

Moderate (0.6 to 2 in./hr)

—

Drainage Class

Well

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.20

—

Soil Productivity

Low to Moderate

—

Soil Manageability

Group

III

—

Class

3Xep

—

Annual Forage Production (lb/acre)

200 to 600

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Goodale family, on fan margins; Taboose family, at lower elevations; the Cartago family, in drainages; and a soil similar to the Taboose family, but with 20 to 40 inches of sandy overburden or that are stony. Included areas make up approximately 20 percent of the map unit area.

387 - Garlet - Stecum families complex, 2 to 15 percent slopes

Elevation: 7,600 to 10,500

Annual Precipitation: 14 to 25 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Garlet family

40 percent

Stream Channels

2 to 15 percent

Quaking Aspen

Stecum family

30 percent

Sideslopes adjacent to Stream Channels

2 to 15 percent

Quaking Aspen

Soil Profile Description

Surface Layer

0 to 6 inches; brown gravelly sandy loam; weak subangular blocky structure; soft; pH 6.7

0 to 9 inches; light gray very cobbly loamy sand; single grain; loose; pH 5.5

Subsoil

6 to 14 inches; yellowish brown very gravelly sandy loam; weak subangular blocky structure; slightly hard; pH 6.9

9 to 24 inches; light brownish gray very cobbly loamy sand; single grain; loose; pH 5.5

Substratum

14 to 24 inches; yellowish brown very gravelly coarse sandy loam; massive; soft; pH 6.8

24 to 60 inches; light yellowish brown very cobbly loamy coarse sand; massive; soft; pH 5.5

24 inches; hard granite bedrock

Soil Properties

Restrictive Layer Depth

24 inches (HB)

Greater than 60 inches

Effective Rooting Depth (inches)

Mod. Deep (20 to 40 inches)

Very Deep (> 60 inches)

Available Water Capacity

Very Low (1.9 inches)

Very Low (2.0 inches)

Water Retention Class

3 (0.8 inches)

3 (0.8 inches)

Hydrologic Soil Group

B-C

A

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Well

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.15

0.15

Soil Productivity

Low

Low

Soil Manageability

Group

III

III

Class

3P

3P

Annual Forage Production (lb/acre)

200 to 400

200 to 500

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Cowood family, in stream channels; the Salt Chuck family, on sideslopes adjacent to stream channels; & Aquic Cryoborolls, in stream channels. Included areas make up approximately 30 percent of the map unit area.

400 - Goodale - Cartago families complex, 5 to 15 percent slopes

Elevation: 3,900 to 6,800 feet

Annual Precipitation: 4 to 10 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Goodale family

55 percent

Alluvial Fans & Terraces

5 to 15 percent

Blackbrush

Cartago family

30 percent

Alluvial Fans & Terraces

5 to 15 percent

Blackbrush

Soil Profile Description

Surface Layer

0 to 12 inches; brown & pale brown bouldery loamy sand; massive; soft; pH 6.8 to 7.4

0 to 10 inches; light yellowish brown gravelly loamy coarse sand; massive; soft; pH 7.8

Subsoil

—

—

Substratum

12 to 60 inches; pale brown extremely stony loamy coarse sand; massive; soft; pH 7.4

10 to 60 inches; light yellowish brown loamy coarse sand & very gravelly & gravelly loamy coarse sand; massive; soft; pH 7.8

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Very Low (1.4 inches)

Low (2.7 inches)

Water Retention Class

3 (0.6 inches)

3 (1.1 inches)

Hydrologic Soil Group

A

B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.15

0.10

Soil Productivity

Low

Low

Soil Manageability

Group

III

III

Class

3P

3P

Annual Forage Production (lb/acre)

< 300

< 300

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Lubkin & Tinemaha families, soils similar to the Goodale or Cartago families, but with a coarse sandy loam texture, & a soil similar to the Goodale family, but without bouldery surface textures. Included areas make up approximately 15 percent of the map unit area.

401 - Taboose family - Lava flows complex, 5 to 30 percent slopes

Elevation: 4,000 to 4,800 feet

Annual Precipitation: 4 to 8 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Taboose family

70 percent

Lava Flows

5 to 30 percent

Shadscale

Lava Flows

15 percent

Lava Flows

—

Barren

Soil Profile Description

Surface Layer

0 to 5 inches; brown very gravelly loamy fine sand; weak subangular blocky structure; soft; pH 7.3

Lava flows consist of bare lava & less than 15 percent inclusions of soil material capable of supporting plants.

Subsoil

—

—

Substratum

5 to 60 inches; pale brown & yellowish brown gravelly fine sandy loam & extremely stony loamy fine sand; massive; soft to slightly hard; pH 7.5

—

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

—

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

—

Available Water Capacity

Low (3.4 inches)

—

Water Retention Class

2 (1.8 inches)

—

Hydrologic Soil Group

B

—

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

—

Drainage Class

Well

—

Max Erosion Hazard

Low to Moderate

—

Erosion Factor (k)

0.10

—

Soil Productivity

Low

—

Soil Manageability

Group

III

—

Class

3Pe

—

Annual Forage Production (lb/acre)

200 to 400

—

Forest Survey Site Class

NC

—

Included Areas & Remarks

Included in this map unit are small areas of the Goodale family, on fan margins; the Avalmount family, at higher elevations; the Cartago family, in drainages; & a soil similar to the Taboose family, but with 20 to 40 inches of sandy overburden or that are stony. Included area make up approximately 15 percent of the map unit area.

402 - Bairs family, 15 to 50 percent slopes

Elevation: 4,600 to 6,800 feet

Annual Precipitation: 6 to 12 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Bairs family

85 percent

Alluvial Fans & Fan Terraces

15 to 50 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 20 inches; brown & grayish brown gravelly loamy coarse sand; single grain; loose; pH 6.5 to 7.0

Subsoil

20 to 44 inches; brown & yellowish brown very stony sandy loam; weak angular blocky structure; slightly hard to hard; pH 7.0

Substratum

44 to 60 inches; very pale brown very stony loamy coarse sand; massive; hard; pH 6.5

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (3.2 inches)

Water Retention Class

3 (1.0 inches)

Hydrologic Soil Group

B

Permeability (in./hr.)

Moderate (0.6 to 2 in./hr.)

Drainage Class

Well

Max Erosion Hazard

Low to High

Erosion Factor (k)

0.10

Soil Productivity

Low to Moderate

Soil Manageability

Group

IV

Class

4EPg

Annual Forage Production (lb/acre)

300 to 500

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Bairs family but have extremely bouldery or bouldery surface layers or more organic matter. Included areas make up approximately 15 percent of the map unit area.

403 - Whitewolf - Toquerville families association, 5 to 60 percent slopes

Elevation: 4,000 to 6,800 feet

Annual Precipitation: 4 to 8 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Whitewolf family

60 percent

Lower Hillsides

5 to 60 percent

Blackbrush

Toquerville family

25 percent

Lower Hillsides

5 to 60 percent

Blackbrush

Soil Profile Description

Surface Layer

0 to 18 inches; light brownish gray loamy coarse sand & coarse sand; single grain; massive; soft; pH 6.8 to 7.3

0 to 5 inches; light brownish gray cobbly sand; weak subangular blocky structure; soft; pH 7.5

Subsoil

—

—

Substratum

18 to 43 inches; brown loamy coarse sand; massive; slightly hard; pH 7.7

5 inches; hard granodiorite bedrock

43 inches; hard granodiorite bedrock

Soil Properties

Restrictive Layer Depth

20 to 43 inches (HB)

3 to 20 inches (HB)

Effective Rooting Depth (inches)

Mod. Deep (20 to 43 inches)

Shallow (0 to 20 inches)

Available Water Capacity

Low (2.7 inches)

Very Low (0.3 inches)

Water Retention Class

2 (1.3 inches)

3 (0.3 inches)

Hydrologic Soil Group

A

D

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Somewhat Excessively

Somewhat Excessively

Max Erosion Hazard

Low to High

Low to High

Erosion Factor (K)

0.10

0.15

Soil Productivity

Low

Low

Soil Manageability

Group

IV

IV

Class

3Egpx

4EDPgx

Annual Forage Production (lb/acre)

< 300

< 300

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of a soil similar to the Toquerville family, but with more than 35 percent rock fragments and rock outcropping. Included area make up approximately 15 percent of the map unit area.

404 - Arizo- Cajon families complex, 0 to 15 percent slopes

Elevation: 3,700 to 4,000 feet

Annual Precipitation: 4 to 7 inches

Soil Map Unit Components
Approx Proportion
Landscape Position
Slope
Typical Vegetation

Arizo family

40 percent

Alluvial Fans & Bench Terraces

0 to 15 percent

Shadscale

Cajon family

40 percent

Alluvial Fans & Bench Terraces

0 to 15 percent

Shadscale

Soil Profile Description

Surface Layer

0 to 4 inches; pale brown gravelly loamy sand; weak subangular blocky structure; soft; pH 7.5

0 to 11 inches; pale & very pale brown loamy sand & gravelly loamy sand; weak platy & weak subangular blocky structure; loose; pH 8.0

Subsoil

—

—

Substratum

4 to 60 inches; pale brown very stony loamy sand; single grain; loose; pH 7.5

11 to 60 inches; light yellowish brown & light gray gravelly loamy sand, coarse loamy sand, loamy sand & sand; single grain; loose; pH 7.6

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Low (2.6 inches)

Low (3.2 inches)

Water Retention Class

3 (0.9 inches)

3 (1.1 inches)

Hydrologic Soil Group

A

B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Excessively

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.15

0.15

Soil Productivity

Low

Low

Soil Manageability

Group

III

III

Class

3P

3P

Annual Forage Production (lb/acre)

< 300

100 to 300

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Bairs family & Xerofluvents. Included areas make up approximately 20 percent of the map unit area.

405 - Lubkin - Tinemaha - Spainhower families complex, 5 to 15 percent slopes

Elevation: 4,400 to 6,000 feet

Annual Precipitation: 4 to 8 inches

Soil Map Unit Components	Lubkin family	Tinemaha family	Spainhower family
Approx Proportion	40 percent	30 percent	20 percent
Landscape Position	Alluvial Fans & Fan Terraces	Alluvial Fans & Fan Terraces	Fan Terraces
Slope	5 to 15 percent	5 to 15 percent	5 to 15 percent
Typical Vegetation	Shadscale	Shadscale	Shadscale

Soil Profile Description

Surface Layer	0 to 5 inches; light yellowish brown gravelly loamy sand; weak subangular blocky structure; soft; pH 6.8	0 to 9 inches; pale brown gravelly loamy coarse sand; single grain & massive; loose & soft; pH 7.2	0 to 5 inches; pale brown cobbly sandy loam; moderate subangular blocky structure parting to thick platy; slightly hard; pH 7.6
Subsoil	5 to 46 inches; light gray very bouldery sandy loam & loamy sand; weak subangular blocky structure; hard & slightly hard; pH 6.8 to 7.2	9 to 27 inches; brown & yellowish brown very cobbly sandy clay loam; moderate subangular blocky structure; hard; pH 7.2	5 to 42 inches; light yellowish brown extremely & very cobbly sandy clay loam, clay & sandy loam; weak & moderate subangular blocky structure; slightly hard & hard; pH 6.6 to 8.0
Substratum	46 to 85 inches; light gray very gravelly loamy sand; massive; slightly hard; pH 7.0	27 to 60 inches; pale brown very stony loamy coarse sand; massive; hard; pH 7.2	42 to 60 inches; light yellowish brown extremely gravelly sandy loam; weak subangular structure; slightly hard; pH 6.8

Soil Properties

Restrictive Layer Depth	Greater than 60 inches	Greater than 60 inches	Greater than 60 inches
Effective Rooting Depth (inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)	Very Deep (> 60 inches)
Available Water Capacity	Low (3.3 inches)	Low (3.2 inches)	Low (2.8 inches)
Water Retention Class	2 (1.4 inches)	2 (1.7 inches)	2 (1.6 inches)
Hydrologic Soil Group	B	A	B
Permeability (in./hr.)	Mod. Rapid (2 to 6 in./hr.)	Mod. Slow (0.2 to 0.6 in./hr.)	Slow (0.06 to 0.2 in./hr.)
Drainage Class	Well	Well	Well
Max Erosion Hazard	Low	Low	Low
Erosion Factor (k)	0.15	0.15	0.15
Soil Productivity	Low	Low to Moderate	Low to Moderate
Soil Manageability Group	II	II	II
Class	2px	2px	2px
Annual Forage Production (lb/acre)	100 to 300	200 to 500	200 to 500
Forest Survey Site Class	NC	NC	NC

Included Areas & Remarks

Included in this map unit are small areas of the Goodale & Cartago families; and a soil similar to the Tinemaha family, but with very bouldery or very stony textures. Included areas make up approximately 10 percent of the map unit area.

406 - Artray - Chesaw families complex, 0 to 5 percent slopes

Elevation: 7,000 to 8,400 feet

Annual Precipitation: 10 to 16 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Artray family

45 percent

Alluvial Fans & Fan Terraces

0 to 5 percent

Sedge - Rush

Chesaw family

40 percent

Alluvial Fans & Fan Terraces

0 to 5 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 28 inches; grayish brown sandy loam & gravelly sandy loam; moderate subangular blocky structure; slightly hard; pH 6.2 to 6.8

0 to 27 inches; grayish brown very gravelly loamy sand; weak subangular blocky structure; soft & slightly hard; pH 6.0 to 6.5

Subsoil

—

—

Substratum

28 to 60 inches; light brownish gray & white gravelly sandy loam & coarse sandy loam; massive; slightly hard; pH 6.6 to 7.6

27 to 60 inches; yellowish brown gravelly loamy sand; massive; soft; pH 6.5

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.9 inches)

Low (2.0 inches)

Water Retention Class

2 (1.8 inches)

3 (1.0 inches)

Hydrologic Soil Group

D

A

Permeability (in./hr.)

Moderate (0.6 to 2 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Poorly

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.24

0.10

Soil Productivity

Moderate to High

Low to Moderate

Soil Manageability

Group

III

III

Class

3Wp

3P

Annual Forage Production (lb/acre)

600 to 1,200

300 to 600

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of frequently flooded soils along drainages & wet organic soils at springs and seeps. Included areas make up approximately 15 percent of the map unit area.

407 - Xerofluvents, 0 to 5 percent slopes

Elevation: 6,000 to 8,400 feet

Annual Precipitation: 6 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Xerofluvents

85 percent

Stream Channels

0 to 5 percent

Willow

Soil Profile Description

Surface Layer

0 to 18 inches; dark gray, light brownish gray & pale brown sandy loam and gravelly sandy loam; moderate granular & massive structure; soft; pH 7.0 to 7.4

Subsoil

—

Substratum

18 to 60 inches; light & greenish gray very gravelly loam & stratified very gravelly sand & very cobbly sandy clay loam; massive & loose; slightly hard & very friable; pH 7.2

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Deep (40 to 60 inches)

Available Water Capacity

Moderate (4.3 inches)

Water Retention Class

2 (2.0 inches)

Hydrologic Soil Group

D

Permeability (in./hr.)

Moderate (0.6 to 2 in./hr.)

Drainage Class

Very Poorly

Max Erosion Hazard

Low

Erosion Factor (K)

0.28

Soil Productivity

Moderate to High

Soil Manageability
Group
Class

III
3Wp

Annual Forage Production (lb/acre)

600 to 1,200

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of poorly drained soils & soils high in organic matter soils lacking cobbles and stones. Included areas make up approximately 15 percent of the map unit area.

408 - Dechambeau family, 2 to 5 percent slopes

Elevation: 6,900 to 7,300 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Dechambeau family

85 percent

Lakeshore Terraces

2 to 5 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 7 inches; light brownish gray gravelly sandy loam; weak thick platy & weak granular structure; soft; pH 6.4

Subsoil

—

Substratum

7 to 60 inches; brown & yellowish brown gravelly sandy loam; massive; slightly hard; pH 6.6

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.6 inches)

Water Retention Class

2 (1.9 inches)

Hydrologic Soil Group

B

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Well

Max Erosion Hazard

Low

Erosion Factor (k)

0.24

Soil Productivity

Moderate

Soil Manageability

Group

II

Class

2p

Annual Forage Production (lb/acre)

400 to 800

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Orecart family, on hummocky areas; a soil that is similar to the Dechambeau soil, but has a very gravelly substratum on narrow lake terrace summits; and Rock outcrops adjacent to short escarpments. Included areas make up approximately 15 percent of the map unit area.

409 - Artray family, 2 to 9 percent slopes

Elevation: 6,900 to 7,300 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Artray family

85 percent

Alluvial Fans & Lakeshore Terraces

2 to 9 percent slopes

Sedge - Rush

Soil Profile Description

Surface Layer

0 to 28 inches; grayish brown sandy loam & gravelly sandy loam; moderate subangular blocky structure; slightly hard; pH 6.2 to 6.8

Subsoil

—

Substratum

28 to 60 inches; light brownish gray & white gravelly sandy loam & coarse sandy loam; massive; slightly hard; pH 6.6 to 7.6

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (5.9 inches)

Water Retention Class

2 (1.8 inches)

Hydrologic Soil Group

D

Permeability (in./hr.)

Moderate (0.6 to 2 in./hr.)

Drainage Class

Poorly

Max Erosion Hazard

Low

Erosion Factor (k)

0.24

Soil Productivity

Moderate to High

Soil Manageability

Group

III

Class

3Wp

Annual Forage Production (lb/acre)

600 to 1,200

Forest Survey Site Class

NC

Included Areas & Remarks

Included in this map unit are small areas of the Dechambeau family, on lakeshore terrace remnants; Aeric Haploaquents on convex areas; & stratified wet soils on low floodplains. Included areas make up approximately 15 percent of the map unit area.

410 - Watterson - Torriorthentic Haploxerolls complex, 5 to 15 percent slopes

Elevation: 5,700 to 7,600 feet

Annual Precipitation: 6 to 15 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Watterson family

40 percent

Alluvial Fans & Lake Terraces

5 to 15 percent

Big Sagebrush

Torriorthentic Haploxerolls

40 percent

Alluvial Fans & Lake Terraces

5 to 15 percent

Big Sagebrush

Soil Profile Description

Surface Layer

0 to 35 inches; pale brown sandy loam & very gravelly sandy loam; weak subangular blocky structure; soft & hard; pH 6.1

0 to 3 inches; brown gravelly sandy loam; single grain; loose; pH 6.5

Subsoil

—

3 to 20 inches; brown gravelly sandy loam; single grain; loose; pH 6.7 to 7.0

Substratum

35 to 60 inches; light yellowish brown sand; single grain; loose; pH 7.0

20 to 60 inches; yellowish brown very cobbly sandy loam; massive; very hard; pH 7.0

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

Greater than 60 inches

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Very Deep (> 60 inches)

Available Water Capacity

Moderate (4.3 inches)

Moderate (5.4 inches)

Water Retention Class

2 (1.7 inches)

2 (1.8 inches)

Hydrologic Soil Group

A

B

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Drainage Class

Well

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.24

0.22

Soil Productivity

Moderate to High

Moderate

Soil Manageability

Group

II

II

Class

2p

2p

Annual Forage Production (lb/acre)

600 to 1,200

400 to 800

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Wrango, Calpine & Sur families. Included areas make up approximately 20 percent of the map unit area.

411 - Sherwin - Buscones families complex, 0 to 15 percent slopes

Elevation: 5,700 to 7,600 feet

Annual Precipitation: 6 to 12 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Sherwin family

40 percent

Rhyolite Flows & Fans

0 to 15 percent

Big Sagebrush

Buscones family

40 percent

Rhyolite Flows & Fans

0 to 15 percent

Blackbrush

Soil Profile Description

Surface Layer

0 to 7 inches; light gray very cobbly loamy fine sand & sandy loam; single grain & massive; loose & soft; pH 6.8

0 to 18 inches; light gray very gravelly loamy sand & loamy sand; single grain; massive; loose & soft; pH 6.9

Subsoil

—

—

Substratum

7 inches; hard rhyolitic tuff

18 to 31 inches; white gravelly loamy sand; massive; soft; pH 6.8

31 inches; weakly consolidated rhyolitic tuff

Soil Properties

Restrictive Layer Depth

4 to 14 inches (HB)

20 to 40 inches (FB)

Effective Rooting Depth (inches)

Very Shallow (0 to 14 inches)

Mod. Deep (20 to 40 inches)

Available Water Capacity

Very Low (0.5 inches)

Low (2.3 inches)

Water Retention Class

3 (0.5 inches)

2 (1.6 inches)

Hydrologic Soil Group

C-D

B

Permeability (in./hr.)

Mod. Rapid (2 to 6 in./hr.)

Rapid (6 to 20 in./hr.)

Drainage Class

Well

Somewhat Excessively

Max Erosion Hazard

Low

Low

Erosion Factor (k)

0.10

0.10

Soil Productivity

Low

Moderate

Soil Manageability

Group

IV

II

Class

4DP

2p

Annual Forage Production (lb/acre)

300 to 500

400 to 800

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Brantel & Delaney families, & Rock outcrop. Included areas make up approximately 20 percent of the map unit area.

412 - Rock outcrop - Buscones family complex, 0 to 15 percent slopes

Elevation: 7,200 to 7,400 feet

Annual Precipitation: 8 to 12 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Rock outcrop

40 percent

Rhyolitic flows

—

Barren

Buscones family

35 percent

Rhyolitic flows

0 to 15 percent

Big Sagebrush

Soil Profile Description

Surface Layer

Rock outcrop consists of continuous bare bedrock & less than 15 percent inclusions of soil material capable of supporting plants.

0 to 18 inches; light gray very gravelly loamy sand & loamy sand; single grain; massive; loose & soft; pH 6.9

Subsoil

—

—

Substratum

—

18 to 31 inches; white gravelly loamy sand; massive; soft; pH 6.8

31 inches; weakly consolidated rhyolitic tuff

Soil Properties

Restrictive Layer Depth

—

20 to 40 inches (FB)

Effective Rooting Depth (inches)

—

Mod. Deep (20 to 40 inches)

Available Water Capacity

—

Low (2.3 inches)

Water Retention Class

—

2 (1.6 inches)

Hydrologic Soil Group

—

B

Permeability (in./hr.)

—

Rapid (6 to 20 in./hr.)

Drainage Class

—

Somewhat Excessively

Max Erosion Hazard

—

Low

Erosion Factor (k)

—

0.10

Soil Productivity

—

Moderate

Soil Manageability

Group

—

II

Class

—

2p

Annual Forage Production (lb/acre)

—

400 to 800

Forest Survey Site Class

—

NC

Included Areas & Remarks

Included in this map unit are small areas of the Brantel, Calpine & Berent families. Included areas make up approximately 25 percent of the map unit area.

413 - Wrango - Pizona families complex, 5 to 30 percent slopes

Elevation: 5,000 to 6,600 feet

Annual Precipitation: 6 to 12 inches

Soil Map Unit Components

Approx Proportion

Landscape Position

Slope

Typical Vegetation

Wrango family

40 percent

Moraine Sideslopes

5 to 30 percent

Pinyon Pine & Big Sagebrush

Pizona family

35 percent

Mountainsides

5 to 30 percent

Pinyon Pine & Big Sagebrush

Soil Profile Description

Surface Layer

0 to 15 inches; grayish brown gravelly loamy coarse sand; single grain; loose; pH 6.8

0 to 11 inches; light brownish gray & light gray cobbly loamy sand; single grain & massive; loose & soft; pH 6.6 to 7.3

Subsoil

—

11 to 44 inches; pale brown & light yellowish brown very cobbly sandy loam; weak & moderate subangular blocky structure; soft to hard; pH 7.6

Substratum

15 to 60 inches; yellowish brown & light brown very gravelly & very cobbly coarse sand; massive; slightly hard; pH 6.8

44 inches; hard basalt bedrock

Soil Properties

Restrictive Layer Depth

Greater than 60 inches

40 to 60 inches (HB)

Effective Rooting Depth (inches)

Very Deep (> 60 inches)

Deep (40 to 60 inches)

Available Water Capacity

Very Low (1.9 inches)

Low (3.0 inches)

Water Retention Class

3 (1.1 inches)

2 (1.3 inches)

Hydrologic Soil Group

A

B

Permeability (in./hr.)

Rapid (6 to 20 in./hr.)

Mod. Slow (0.2 to 0.6 in./hr.)

Drainage Class

Somewhat Excessively

Well

Max Erosion Hazard

Low to Moderate

Low to Moderate

Erosion Factor (k)

0.15

0.05

Soil Productivity

Low to Moderate

Low to Moderate

Soil Manageability

Group

III

II

Class

3Pe

2ep

Annual Forage Production (lb/acre)

200 to 500

300 to 600

Forest Survey Site Class

NC

NC

Included Areas & Remarks

Included in this map unit are small areas of the Sur & Kiona families, & Torriorthentic Haploxerolls. Included areas make up approximately 25 percent of the map unit area.

Soil Classification

The system of soil classification used by the National Cooperative Soil Survey has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. This survey was mapped to the family level. In table 3, the soils of the survey area are listed alphabetically and are classified according to the system. Table 4 lists the soil major components of each map unit. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences between orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in "sol". An example is Alfisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Xeralf (Xer meaning dry, plus alf, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haploxeralf (Hapl, meaning minimal hori-

zonation, plus xeralf, the suborder of the Alfisols that have a xeric moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group, but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective Lithic identifies the subgroup that has hard parent rock within 50 centimeters of the surface. An example is Lithic Haploxeralfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is loamy, mixed, thermic Lithic Haploxeralfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Orders in Survey Area

Five soil orders are represented in the Inyo National Forest westside survey area: Entisols, Inceptisols, Aridisols, Mollisols and Alfisols.

The soils in the survey area have xeric and torric moisture regimes and thermic, mesic, frigid or cryic temperature regimes. The xeric moisture regime is typical in Mediterranean climates, where summers are warm and dry and winters are cool and moist. Therefore, unless the soil is irrigated, its moisture control section is dry in all parts for 45 consecutive days or more from July until October in six out of ten years. The moisture control section is moist in all parts for 45 consecutive days or more from December until May. A soil with a torric moisture regime normally occur in arid environments. Generally, unless a soil is irrigated, its moisture control section is dry for more than half the year and moist in some or all parts for less than 90 consecutive days.

The temperature regime is thermic at lower elevations, particularly on south and southwest-facing aspects. In a thermic temperature regime, the soil temperature at a depth of 20 inches ranges from 59 to 72°F. At slightly higher elevations, the temperature regime is mesic. In a mesic temperature regime, the soil temperature at a depth of 20 inches ranges from 47 to 59°F. In frigid and cryic temperature regimes, which occur at the highest elevation, particularly on north-facing aspects for the cryic regime, the soil temperature at a depth of 20 inches ranges from 32 to 47°F. A soil with a frigid regime is warmer in the summer than a soil with a cryic regime.

Entisols are immature soils that have little or no evidence of development of pedogenic horizons. Entisols in the survey area are Aquent, Fluvent, Orthent and Psamment suborders. Generally, these soils do not have a subsurface (B) horizon, and have in most cases, less than one percent organic matter.

Aquents have wet conditions in some part of the profile in most years, have a texture of loamy fine sand or coarser and enough active ferrous iron to be evident in prominent reddish or yellowish hue. These soils are found in wet meadows and near saline water bodies.

Fluvents have a slope of less than 25 percent, an irregular decrease on organic-carbon content from a depth of 10 inches to a depth of 100 inches. The organic carbon reaches a level of 0.2 percent carbon or more within a depth of 100 inches. Conversely, Orthents have a slope of greater than 25 percent or have an

organic carbon content that decrease regularly with increasing depth. In the Orthent subgroup, organic carbon reaches a level of 0.2 percent or less within a depth of 100 inches. Orthents have a particle-size class that is loamy or finer in texture in some horizon below the Ap. Meanwhile, Psamments are loamy fine sand or coarser in the textural control section. These soils are found on alluvial fans and are deep to very deep. The Fluvents, Orthents and Psamments have been placed in the Xerofluvents, Xerorthents, Torriorthents, Cryorthents, Torripsamments and Cryopsamments great groups since they have Xeric or Torric moisture regimes or a cryic temperature regime.

Inceptisols are soils in which weakly-developed altered horizons have developed but have retained some weatherable minerals. These soils do not have an illuvial horizon enriched either with silicate clay that contains aluminum or with an amorphous mixture of aluminum and organic carbon.

The Inceptisols in the survey area are in the Ochrept and Umbrept suborders. Soils in the Ochrept suborder have a ochric epipedon, basically a light-colored surface layer with little organic matter, and a weakly-developed B horizon or cambic horizon. Soils in the Umbrept suborder have a umbric epipedon and a cambic horizon. An umbric epipedon is a surface layer which has a dark color, at least one percent organic matter, is more than seven inches thick, has less than 50 percent base saturation and is not both hard and massive. The texture is coarse sandy loam or finer. These soils have a xeric soil moisture regime or a cryic temperature regime and thus have been placed in the Xerochrept, Cryochrept and Cryumbrept great groups.

Aridisols are soils which have an aridic (torric) soil moisture regime and have a ochric epipedon. Aridisols in the survey area are Durids, Argids and Cambids. Durids are soils which have a duripan, which is a subsurface horizon, cemented by illuvial silica and has its upper boundary within 38 inches of the soil surface. Argids are Aridisols that have illuvial horizon enriched with silicate clay or sodium and an epipedon that is not both hard and massive when dry. Conversely, Cambids do not have illuvial horizons enriched in silicate clay, but have may have horizons enriched in calcium carbonate, magnesium carbonate, or gypsum.

Mollisols typically have a dark-colored surface layer or epipedon which is more than seven inches thick, has more than one percent organic matter, and more than 50 percent base saturation and is not both hard and massive.

In the survey area, the Mollisols are in the Aquoll, Boroll, and Xeroll suborders. Aquolls have wet conditions for some time in most years and may have a histic epipedon or high sodium percentage in the upper part of the surface layer or a distinct redox concentration in the lower part of the mollic epipedon. Borolls have either a frigid, cryic or peregelic temperature regime. Finally, Xerolls are Mollisols that have a xeric moisture regime.

Borolls are divided into two great groups: Cryoborolls and Paleborolls. Cryoborolls are soils that do not have a clay-enriched B horizon and have a cryic temperature regime. Soils that have a clay-enriched B horizon and a texture finer than loamy fine sand are classified as Paleborolls.

Xerolls are also divided into two great groups: Argixerolls and Haploxerolls. In this comparison, Argixerolls have a B horizon enriched with silicate clay and Haploxerolls do not.

Alfisols are soils that have a massive and hard surface horizon and an argillic (clay accumulation) B horizon. They have high base saturation, and water is held at less than 15 bar tension during at least three months of each year when the soil is warm enough for plants to grow. Alfisols in this area have been placed in the Boralf and Xeralf suborders. Boralfs have either a frigid, cryic or peregelic temperature regime and Xeralfs have a xeric soil moisture regime.

TABLE 3. - Classification of the Soils

Soil Name	Family or Higher Taxonomic Class
Abgese family	Fine-loamy, mixed, mesic Lithic Xeric Haplargids
Aeric Endoaquents	Aeric Endoaquents
Alamedawell family	Ashy, calcareous, mesic Vitrandic Torriorthents
Aquandic Endoaquolls	Aquandic Endoaquolls
Aquic Cryoborolls	Aquic Cryoborolls
Aquic Haploxerolls	Aquic Haploxerolls
Arizo family	Sandy-skeletal, mixed, thermic Typic Torriorthents
Artray family	Coarse-loamy, mixed, mesic Cumulic Endoaquolls
Atter family	Sandy-skeletal, mixed, mesic Typic Xerorthents
Avalmount family	Ashy-skeletal, mesic Vitrixerandic Haplocambids
Bairs family	Loamy-skeletal, mixed, mesic Xeric Haplargids
Basket family	Loamy-skeletal, mixed, frigid Xeric Haplargids
Bearskin family	Loamy, mixed, frigid Lithic Argixerolls
Berent family	Mixed, mesic Xeric Torripsamments
Biglake family	Sandy-skeletal, mixed, frigid Typic Haploxerolls
Brantel family	Ashy, mesic Vitrandic Torripsamments (86P0976)
Buscones family	Ashy, mesic Vitrandic Torripsamments
Cajon family	Mixed, thermic Typic Torripsamments
Calpine family	Coarse-loamy, mixed, mesic Aridic Haploxerolls
Cartago family	Sandy, mixed, thermic Xeric Torriorthents
Charcol family	Loamy-skeletal, mixed Cryic Pachic Paleborolls
Chesaw family	Sandy-skeletal, mixed, frigid Entic Haploxerolls
Corbett family	Mixed, frigid Typic Xeropsamments
Cowood family	Loamy-skeletal, mixed Lithic Cryochrepts

Soil Name	Family or Higher Taxonomic Class
Cozetica family	Ashy, frigid Vitrandic Torripsamments (86P0979)
Credo family	Fine-loamy, frigid Xeric Haplargids
Cumulic Haploxerolls	Cumulic Haploxerolls
Dechambeau family	Coarse-loamy-skeletal, mixed (nonacid), mesic Xeric Torriorthents
Deepwell family	Ashy, mesic Vitrandic Torripsamments
Delaney family	Ashy, mesic Vitrandic Xeropsamments
Fez family	Ashy, frigid Vitrandic Haploxerolls
Garlet family	Loamy-skeletal, mixed Typic Cryochrepts
Glean family	Loamy-skeletal, mixed, frigid Pachic Haploxerolls
Goodale family	Sandy-skeletal, mixed, thermic Xeric Torriorthents
Guiser family	Loamy-skeletal, mixed Mollic Cryoboralfs
Haypress family	Sandy, mixed, frigid Entic Haploxerolls
Jaybee family	Loamy, mixed, mesic Lithic Xeric Haplargids
Kilburn family	Loamy-skeletal, mixed, mesic Typic Haploxerolls
Kiona family	Loamy-skeletal, mixed, mesic Xeric Haplocambids
Koehler family	Sandy, mixed, mesic Xeric Haplodurids
Labshaft family	Loamy-skeletal, mixed Lithic Cryoborolls
Lakash family	Ashy-pumiceous, mesic Vitrandic Torriorthents (86P0977)
Lithic Cryorthents	Lithic Cryorthents
Lubkin family	Loamy-skeletal, mixed, thermic Xeric Haplargids
Mascamp family	Loamy-skeletal, mixed, frigid Lithic Argixerolls
Mottsville family	Sandy, mixed, mesic Torripsammentic Haploxerolls
Nanamkin family	Sandy-skeletal, mixed, frigid Typic Xerorthents
Neuske family	Fine-loamy, mixed, frigid Mollic Haploxeralfs
Ola family	Coarse-loamy, mixed, frigid Pachic Haploxerolls

Soil Name	Family or Higher Taxonomic Class
Orecart family	Ashy, mesic Vitrandic Torripsamments
Pass Canyon family	Loamy, mixed, mesic Lithic Argixerolls
Pizona family	Loamy-skeletal, mixed, mesic Xeric Haplargids
Poole family	Fine-silty, mixed (calcareous), mesic Typic Endoaquents
Powment family	Sandy-skeletal, mixed, frigid, shallow Typic Xerorthents
Preston family	Mixed, mesic Typic Xeropsamments
Railcity family	Sandy-skeletal, mixed, frigid Typic Xerorthents
Salt Chuck family	Sandy-skeletal, mixed Entic Cryumbrepts
Sherwin family	Ashy, nonacid, mesic Lithic Xeric Torriorthents
Sonoma family	Fine-silty, mixed (calcareous), mesic Aerice Fluvaquents
Spainhower family	Clayey-skeletal, mixed, thermic Xeric Haplargids
Springmeyer family	Fine-loamy, mixed, mesic Aridic Argixerolls
Stacy family	Coarse-loamy, mixed, mesic Aridic Duric Haploxerolls
Stecum family	Sandy-skeletal, mixed Typic Cryorthents
Sumine family	Loamy-skeletal, mixed, frigid Aridic Argixerolls
Sur family	Loamy-skeletal, mixed, mesic Entic Haploxerolls
Taboose family	Ashy-skeletal, thermic Vitrandic Torriorthents
Tinemaha family	Loamy-skeletal, mixed thermic Xeric Haplargids
Toquerville family	Mixed, thermic Lithic Torripsamments
Torriorthentic Haploxerolls	Torriorthentic Haploxerolls
Typic Fluvaquents	Typic Fluvaquents
Vitrandic Cryopsamments	Vitrandic Cryopsamments
Vitrandic Cryorthents	Vitrandic Cryorthents
Vitrandic Haplodurids	Vitrandic Haplodurids
Vitrandic Haploxerolls	Vitrandic Haploxerolls (86P0975)

Soil Name	Family or Higher Taxonomic Class
Vitrandid Torriorthents	Vitrandid Torriorthents
Vitrandid Torripsamments	Vitrandid Torripsamments
Vitrandid Xerochrepts	Vitrandid Xerochrepts
Vitrandid Xerofluvents	Vitrandid Xerofluvents
Vitrandid Xerorthents	Vitrandid Xerorthents (86P0978, 86P0981, 86P0982, 86P0983)
Vitrandid Xeropsamments	Vitrandid Xeropsamments (86P0984)
Waterman family	Sandy-skeletal, mixed, mesic Lithic Xerorthents
Watterson family	Loamy-skeletal, mixed, mesic Pachic Haploxerolls
Whitewolf family	Mixed, thermic Xeric Torripsamments
Wrango family	Sandy-skeletal, mixed, mesic Xeric Torriorthents
Xeric Torriorthents	Xeric Torriorthents
Xerofluvents	Xerofluvents
Yellowhills family	Ashy, mesic Vitritorrandic Haploxerolls

Table 4 - Soil Components in Map Units
(Miscellaneous area and minor components are not included)

Soil Name	Map Unit
Abgese family	302, 303, 304
Aeric Endoaquents	381
Alamedawell family	379
Aquandic Endoaquolls	155
Aquic Cryoborolls	159
Aquic Haploxerolls	374
Arizo family	404
Artray family	406, 409
Atter family	312, 313, 346
Avalmount family	386
Bairs family	402
Basket family	326, 335
Bearskin family	323, 333, 334, 368
Berent family	322, 341, 353, 354, 361, 362
Biglake family	110, 332, 349, 352
Brantel family	139, 142, 146, 163, 310, 315, 317, 382
Buscones family	411, 412
Cajon family	404
Calpine family	172, 175, 176
Cartago family	400
Charcol family	156, 158, 206
Chesaw family	108, 110, 203, 406
Corbett family	111, 131, 132, 133, 204, 345
Cowood family	156, 363
Cozetica family	140 144
Credo family	336
Cumulic Haploxerolls	384
Dechambeau family	378, 408
Deepwell family	375, 379, 383
Delaney family	305, 306, 316, 341
Fez family	173, 318, 324
Garlet family	363, 365, 387
Glean family	205, 215, 338
Goodale family	400
Guiser family	157
Haypress family	114, 116, 160
Jaybee family	325, 357
Kilburn family	348, 355, 356
Kiona family	350, 370
Koehler family	331

Soil Name	Map Unit
Labshaft family	371, 373
Lakash family	146
Lithic Cryorthents	201, 342, 369
Lubkin family	405
Mascamp family	326, 336, 368
Mottsville family	172, 177, 351
Nanamkin family	149, 200, 204, 205, 217, 323, 345, 347, 355, 356, 369, 372
Neuske family	301, 335
Ola family	338
Orecart family	378, 383
Pass Canyon family	302, 303, 304, 325, 343
Pizona family	413
Poole family	377, 381, 382
Powment family	359, 360, 372
Preston family	343, 364
Railcity family	108, 132, 133, 216, 218
Salt Chuck family	148, 340, 352, 371
Sherwin family	411
Sonoma family	377
Spainhower family	405
Springmeyer family	170
Stacy family	331
Stecum family	148, 157, 158, 201, 206, 213, 342, 365, 366, 367, 387
Sumine family	171
Sur family	319, 320, 350
Taboose family	401
Tinemaha family	405
Toquerville family	403
Torriorthentic Haploxerolls	161, 162, 174, 177, 328, 329, 330, 410
Typic Fluvaquents	384
Vitrantic Cryopsamments	136, 150, 152, 153
Vitrantic Cryorthents	101, 122, 126, 127, 145, 150, 154
Vitrantic Haplodurids	380
Vitrantic Haploxerolls	105, 115, 121, 124, 149
Vitrantic Torriorthents	314, 316, 317, 380, 385
Vitrantic Torripsamments	375
Vitrantic Xerochrepts	164
Vitrantic Xerofluvents	169
Vitrantic Xerorthents	101, 107, 115, 122, 124, 126, 137, 138, 143, 308, 337, 344
Vitrantic Xeropsamments	106, 107, 111, 121, 122, 131, 134, 138, 143, 145, 151, 173, 307, 309, 311, 324, 337

Soil Name	Map Unit
Waterman family	319, 320
Watterson family	410
Whitewolf family	403
Wrango family	312, 313, 327, 328, 329, 330, 339, 353, 358, 361, 413
Xeric Torriorthents	362
Xerofluvents	407
Yellowhills family	163, 321

Taxonomic Unit Descriptions

In this section, each soil family or higher category recognized in the survey area is described. The descriptions are arranged in alphabetical order. Characteristics of the soil and the material in which it formed are identified for each family. The pedon, a small three-dimensional area of the soil that is typical of the soil profile in the survey area, is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual.

Many of the technical terms used in the descriptions are defined in *Keys to Soil Taxonomy*. The soil moisture conditions at the time soil colors were described are given. Following the pedon description is the range of important characteristics of the soils in each family. The map units of each soil family are described in the section "Detailed Soil Map Units".

ABGESE FAMILY

The Abgese family consists of moderately deep, well drained soils forming in material weathering from granitic rock. These soils are on mountainsides, and have slopes of 15 to 90 percent. Elevation is 6,600 to 9,600 feet. The mean annual precipitation is about 5 to 25 inches, and the mean annual temperature is about 45°F.

Taxonomic Class: Fine-loamy, mixed, mesic Xeric Haplargids

Typical Pedon: The representative profile for this soil is on a northwest-facing mountainside, under pinyon pine and big sagebrush, at an elevation of 7,600 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 3 inches; grayish brown (10YR 5/2) cobbly coarse sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine, and few medium roots; many medium interstitial pores; 15 percent gravel, 10 percent cobbles and 5 percent stones; slightly acid (pH 6.5); clear wavy boundary.

A2 – 3 to 7 inches; grayish brown (10YR 5/2) loamy coarse sand, dark brown (10YR 3/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine, and few medium roots; many medium interstitial pores; 5 percent gravel and 5 percent cobbles; neutral (pH 6.8); clear wavy boundary.

BE – 7 to 10 inches; brown (10YR 5/3) gravelly loamy sand, dark brown (10YR 4/3) moist; weak fine subangular blocky structure, parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic; many very fine and fine, and few medium roots; many medium interstitial pores; 25 percent gravel and 5 percent cobbles; neutral (pH 6.8); abrupt smooth boundary.

2Bt1 – 10 to 17 inches; yellowish brown (10YR 5/4) gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure, parting to moderate very fine and fine subangular blocky; slightly hard, firm, sticky and slightly plastic; few very fine, fine and medium roots; few very fine, fine and medium interstitial pores; few thin clay films on ped faces and lining interstitial pores; 15 percent gravel; neutral (pH 6.6); clear wavy boundary.

2Bt2 – 17 to 26 inches; yellowish brown (10YR 5/4) very gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate coarse subangular blocky structure, parting to moderate fine and medium subangular blocky; hard, firm, sticky and plastic; few very fine and fine roots; few very fine and fine interstitial pores; few moderately thick clay films bridging mineral sand grains; 40 percent gravel; neutral (pH 6.6); abrupt smooth boundary.

Cr – 26 inches; weathered granitic bedrock, which can be cut with a tilespade.

Type Location: About 660 feet east and 165 feet south of the apparent center of Section 23, T.1S., R.30E., MDBM, Glass Mountain SW Quadrangle.

Range in Characteristics: Soil depth is 20 to 40 inches to paralithic or lithic contact. The mean annual soil temperature at 20 inches is about 53°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The textural control section is all of the argillic horizon. It is sandy clay loam with 27 to 32 percent clay. Rock fragments are 5 to 40 percent gravel and 0 to 20 percent cobbles, and average 25 to 29 percent by volume.

Some pedons lack BE horizons. Other pedons have C horizons underlying the argillic horizon.

The surface A horizon has dry color of 10YR 5/2 or 6/3; moist color is 10YR 3/2 or 3/3. It is loamy sand or coarse sand, with 1 to 3 percent clay. Rock fragments are 15 to 55 percent gravel, 10 to 20 percent cobbles and 5 to 10 percent stones by volume. Reaction is slightly acid to neutral.

The underlying A horizons have dry color of 10YR 5/2, 5/3 or 6/3; moist color is 10YR 3/3 or 4/3. They are sandy loam, loamy sand or loamy coarse sand, with 1 to 5 percent clay. Rock fragments are 5 to 25 percent gravel, 5 to 20 percent cobbles and 0 to 10 percent stones by volume. Reaction is neutral.

The B horizon has dry color of 10YR 5/3 or 5/4; moist color is 10YR 4/3 or 4/4. It is sandy clay loam, with 27 to 32 percent clay. Rock fragments are 5 to 40 percent gravel and 0 to 20 percent cobbles by volume. Reaction is neutral.

AERIC ENDOAQUENTS

These Aeric Endoaquents consist of deep, poorly drained soils forming in alluvium and lake sediments weathered from mixed rocks which includes a high percentage of volcanic ash. These soils are on lake terraces, and have slopes of 0 to 2 percent. Elevation is 6,300 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Aeric Endoaquents

Typical Pedon: The representative profile for this soil is on a southeast-facing lake terrace, under saltgrass, sedges with some greasewood and rabbitbrush, at an elevation of 6,400 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 3 inches; light olive gray (5Y 6/2) sandy loam, olive gray (5Y 5/2) moist; weak coarse platy structure to massive; slightly hard, very friable, slightly sticky and plastic; few very fine and fine roots; common very fine and fine vesicular and irregular pores; strongly effervescent; moderately alkaline (pH 8.4); abrupt smooth boundary.

C1 – 3 to 12 inches; light olive gray (5Y 6/2) coarse sandy loam, olive (10YR 4/3) moist; massive and single grain; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine, few medium and coarse roots; common fine irregular pores; strongly effervescent; very strongly alkaline (pH 9.2); abrupt smooth boundary.

C2 – 12 to 20 inches; pale olive (5Y 6/3) silty clay loam, olive (5Y 4/3) moist; massive; slightly hard, very friable, sticky and plastic; many very fine and fine, few medium and coarse roots; few very fine tubular pores; strongly effervescent; very strongly alkaline (pH 9.4); abrupt smooth boundary.

C3 – 20 to 40 inches; light gray (5Y 7/2) silty clay loam,

olive gray (5Y 4/2) moist; massive to weak fine platy structure; slightly hard, very friable, sticky and plastic; common very fine and fine, few medium and coarse roots; common very fine and fine tubular pores; strongly effervescent; strongly alkaline (pH 9.0); abrupt smooth boundary.

C4 – 40 to 60 inches; olive gray (5Y 5/2) silt loam, olive gray (5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky and plastic; few very fine, fine and medium roots; very few very fine and fine pores interstitial pores; strongly effervescent; strongly alkaline (pH 9.0).

Type Location: The representative pedon is from the Bodie-Coleville survey, at northeast corner of the northeast corner, Sec., 32, T.3N., R.27E., Mono County, Bodie SW Quadrangle.

Range in Characteristics: Soil depth ranges from 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The texture of the control section is silty clay loam or silt loam, and clay content ranges from 20 to 35 percent. The soil is strongly calcareous and strongly or very strongly alkaline (pH 9.0 to 9.4). Hue is mostly 5Y but strata with 2.5Y hue are in some pedons. Value is mostly 6 or 7 dry and 4 or 5 moist but ranges to 5 dry and 3 moist in strata of some pedons. Chroma is 2, 3, or 4.

The A horizon has color of 5Y 6/3, 5/3, 7/2, 5/3, and 5/2 dry; and 5Y 5/2, 5/3, 5/4, 4/2, 4/3 and 4/4 moist. It is sandy loam, with 4 to 18 percent clay. Reaction is moderately alkaline.

The C horizon has color of 5Y 7/2, 7/3, 7/4, 6/2, 6/3, 6/4, 5/4, 5/3 and 5/2 dry; and 5Y 5/2, 5/3, 5/4, 4/2, 4/3 and 4/4 moist. It is silty clay loam silt loam or coarse sandy loam, with 4 to 35 percent clay. Reaction is strongly alkaline.

ALAMEDAWELL FAMILY

The Alamedawell family consists of very deep, somewhat excessively drained soils forming from ashy alluvium or aeolian deposits underlain by old lake sediments. These soils are on hummocky lake terraces, and have slopes of 2 to 15 percent. Elevation is 6,400 to 6,700 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 47°F.

Taxonomic Class: Ashy, calcareous, mesic Vitrandic Torriorthents

Typical Pedon: The representative profile for this soil is on a northeast-facing lake terrace, in an interdune, under Douglas rabbitbrush, Wyoming big sagebrush, gray horsebrush, little horsebrush, greasewood, annual forbs, Indian ricegrass, inland saltgrass, Nevada dalea and common pricklygilia, at an elevation of 6,660 feet. Slope is 3 percent. When described (6/3/80), the soil was moist throughout. Colors are for dry soil unless otherwise noted.

A – 0 to 3 inches; light gray (10YR 7/2) loamy sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; 5 percent fine pumice gravel; moderately alkaline (pH 8.2); clear smooth boundary.

C1 – 3 to 32 inches; light gray (10YR 7/2) loamy sand, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.3); abrupt smooth boundary.

2Cq2 – 32 to 38 inches; light gray (2.5Y 7/2) silt loam, light brownish gray (2.5Y 6/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; discontinuous 1/8 inch thick silica-cemented laminar capping, violently effervescent; strongly alkaline (pH 8.8); abrupt smooth boundary.

2C3 – 38 to 39 inches; light gray (10YR 7/1) silt loam, light gray (10YR 6/1) moist; strong medium platy structure; hard, firm, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; violently effervescent; strongly alkaline (pH 8.8); abrupt smooth boundary.

2C4 – 39 to 42 inches; light gray (2.5Y 7/2) silt loam, light brownish gray (2.5Y 6/2) moist; massive; soft,

very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; violently effervescent; strongly alkaline (pH 8.8); abrupt smooth boundary.

2C5 – 42 to 45 inches; light gray (10YR 7/1) silt loam, light gray (10YR 6/1) moist, with bands of light gray (2.5Y 7/2) and light brownish gray (2.5Y 6/2) moist; strong medium platy structure; hard, firm, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; strongly effervescent; strongly alkaline (pH 8.9); abrupt smooth boundary.

3C6 – 45 to 46 inches; light gray (2.5Y 7/2) sand, light brownish gray (2.5Y 6/2) moist; with yellow (2.5Y 7/6) mottles, olive yellow (2.5Y 6/6) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; strongly effervescent; strongly alkaline (pH 8.9); abrupt smooth boundary.

4C7 – 46 to 60 inches; light olive gray (5Y 6/2) silt loam, olive gray (5Y 5/2) moist; moderate medium and coarse subangular blocky structure; hard, firm, nonsticky and nonplastic; few very fine roots; few very fine interstitial and tubular pores; violently effervescent; strongly alkaline (pH 8.9).

Type Location: In the Bodie-Coleville Soil Survey Area, about 14 miles east by northeast of Lee Vining, California, 0.2 mile west of a prominent drainageway and 20 feet north of jeep trail, between two dunes; about 1,250 feet west and 2,750 feet north of the southeast corner of Section 36, T.3N., R.28E., MDBM, Trench Canyon Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. Depth to the stratified laeustrine sediments is 20 to 36 inches. Ash content is 60 to 80 percent by weight in the A and upper C horizon, and 30 to 50 percent in the lower C horizon lake sediments. The moist bulk density of the A and the upper C horizons is 1.3 to 1.45 g/cc and the dry bulk density is 1.1 to 1.25 g/cc. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F.

The A horizon has dry color of 10YR 7/2 or 6/2; moist color is 10YR 5/2 or 4/2. It is loamy sand. Rock fragments are 5 to 10 percent fine pumice gravel by

volume. Reaction is mildly or moderately alkaline.

The upper C horizon has dry color of 10YR 7/2 or 6/2; moist color is 10YR 5/2 or 4/2. It is loamy sand or sand, with 1 to 5 percent clay. Rock fragments are 0 to 5 percent fine pumice gravel by volume. It is slightly to strongly effervescent. Lime is disseminated and the soil contains slightly more soluble salts and exchangeable sodium than the A horizon. Reaction is slightly to moderately alkaline.

The 2C, 3C and 4C horizons have dry color of 5Y 5/2

or 6/2, or 2.5Y 6/2 or 7/2, or 10YR 7/1, 7/2 or 8/1; moist color is 5Y 4/2 or 5/2, or 2.5Y 4/2, 5/2 or 6/2, or 10YR 5/1, 5/2 or 6/1. Mottles with bright chroma are present in some horizons. These horizons consist of thin strata of silt loam, loam or sand. Typically, the strata range from 1 to 7 inches thick, but some may be as thick as 15 inches. Gravelly substratum soils are recognized, with textures of stratified very gravelly loamy sand through gravelly sand. Sandy substratum phases are also recognized. The exchangeable sodium percentage ranges from 15 to 30 ds/m. Reaction is moderately to strongly alkaline.

AQUANDIC ENDOAQUOLLS

These Aquandic Endoaquolls consist of deep, poorly drained soils forming in alluvium derived from pyroclastic deposits which include pumice and volcanic ash. These soils are in bottomlands and concave sand flats, and have slopes of 0 to 5 percent. Elevation is 7,800 to 8,100 feet. The mean annual precipitation is about 10 to 15 inches, and the mean annual temperature is about 45°F.

Taxonomic Class: Aquandic Endoaquolls

Typical Pedon: The representative profile for this soil is on a southeast-facing sand flat, under big sagebrush, various sedges and grasses, at an elevation of 7,800 feet. Slope is 4 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 1 inch; gray (10YR 5/1) gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few fine roots; many fine interstitial pores; 15 percent gravel; neutral (pH 7.0); clear smooth boundary.

A2 – 1 to 10 inches; gray (10YR 5/1) gravelly coarse sand, very dark grayish brown 10YR 3/2) moist; weak very fine and fine granular & single grain structure; soft, very friable, nonsticky and nonplastic; many very fine, fine and medium roots; many very fine and fine interstitial pores; 15 percent gravel; moderately acid (pH 5.8); clear wavy boundary.

C1 – 10 to 29 inches; gray (10YR 6/1) gravelly coarse sand, gray (10YR 5/1) moist, with many medium distinct yellowish brown (10YR 5/4) mottles; single grain; loose, nonsticky and nonplastic; common fine

roots; many very fine and fine interstitial pores; 25 percent gravel; neutral (pH 7.0); gradual wavy boundary.

C2 – 29 to 60 inches; gray (10YR 6/1) gravelly coarse sand, gray (10YR 5/1) moist, with many medium distinct yellowish brown (10YR 5/4) mottles; single grain; loose, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; 25 percent gravel; neutral (pH 7.0).

Type Location: About 300 feet northwest of Highway 120 in Big Sand Flat, at the northwest quarter of Section 9, T.1S., R.28E., MDBM, Cowtrack Mtn NW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 48°F. The mean summer temperature is about 67°F, and the mean winter soil temperature is about 35°F. The 10 to 40 inch textural control section is coarse sand, sand or loamy coarse sand, with 0 to 4 percent clay. Rock fragments are 5 to 40 percent gravel.

The A horizon has dry color of 10YR 4/1, 5/1 or 6/1; moist color is 10YR 3/2, 4/1, 4/2 or 5/1. It is coarse sand, sand or loamy coarse sand, with 0 to 4 percent clay. Rock fragments are 5 to 25 percent gravel. Reaction is moderately acid to neutral.

The C horizon has dry color of 10YR 5/1 or 6/1; moist color is 10YR 3/2, 4/1, 4/2 or 5/1, with many medium distinct mottles that have 10YR 5/4 color. It is coarse sand, sand or loamy coarse sand, with 0 to 4 percent clay. Rock fragments are 15 to 40 percent gravel. Reaction is neutral.

AQUIC CRYOBOROLLS

These Aquic Cryoborolls consist of moderately deep to deep, poorly drained soils forming in alluvial and colluvial materials weathering from mixed rocks. These soils are in mountain basins, and have slopes of 5 to 30 percent slopes. Elevation is 7,300 to 10,600 feet. The mean annual precipitation is about 10 to 25 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Aquic Cryoborolls

Typical Pedon: The representative profile for this soil is on an east by southeast-facing mountain basin, under lodgepole pine, willows and grasses, at an elevation of 9,520 feet. Slope is 12 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 3 inches; brown (10YR 5/3) sand, dark brown (10YR 3/3) moist; single grain; soft, very friable, nonsticky and nonplastic; many very fine, fine and medium roots; many very fine and fine interstitial pores; slightly acid (pH 6.5); abrupt smooth boundary.

2A – 3 to 4 inches; brown (10YR 4/3) loamy sand, very dark brown (10YR 2/2) moist; single grain; soft, very friable, nonsticky and nonplastic; few very fine and fine and common medium roots; many very fine and fine interstitial pores; slightly acid (pH 6.5); abrupt smooth boundary.

3A – 4 to 15 inches; grayish brown (10YR 5/2) sand, dark brown (10YR 3/3) moist; single grain; soft, very friable, nonsticky and nonplastic; common very fine, fine and medium roots; many very fine and fine interstitial pores; neutral (pH 7.0); clear smooth boundary.

4A – 15 to 21 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; single grain; soft, very friable, nonsticky and nonplastic; common fine, medium and coarse roots; many very fine and fine interstitial pores; 2 percent gravel and 2 percent cobbles; slightly acid (pH 6.5); clear smooth boundary.

4C – 21 to 27 inches; brown (10YR 5/3) loamy sand, brown (10YR 4/3) moist, with few fine and medium prominent brownish yellow (10YR 6/6) mottles, yellowish red (5YR 4/6) moist; single grain; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium and coarse roots; many very

fine and fine interstitial pores; 2 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.

5C – 27 to 34 inches; brown (10YR 5/3) extremely gravelly sand, very dark grayish brown (10YR 3/2) moist, with many fine and medium prominent brownish yellow (10YR 6/6) mottles, yellowish red (5YR 5/8) moist; single grain; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine and common medium interstitial pores; 50 percent gravel, 15 percent cobbles and 10 percent stones; strongly acid (pH 5.5); abrupt wavy boundary.

6C – 34 to 43 + inches; variegated dark gray (10YR 4/1) and pale brown (10YR 6/3) very gravelly coarse sand, variegated very dark gray (10YR 3/1) and yellow (10YR 7/6) moist; single grain; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine and common medium interstitial pores; 55 percent gravel and 5 percent cobbles; strongly acid (pH 5.5).

Type Location: About 0.65 miles north on Log Cabin road from its intersection with Highway 120, directly north of Mono Lake Ranger Station, then 3.4 miles on west fork, then 0.25 miles on west-forking trail, and 50 feet south of trail, at northeast quarter of the southwest quarter of Section 1, T.1N., R.25E., MDBM, Mono Craters NW Quadrangle.

Range in Characteristics: Soil depth ranges from 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 43°F. The mean summer soil temperature is about 58°F, and the mean winter soil temperature is about 33°F. The 10 to 40 inch textural control section is coarse sand, sand, loamy coarse sand or loamy sand, with 0 to 5 percent clay. Rock fragments are 0 to 60 percent gravel, 0 to 15 percent cobbles and 0 to 10 percent stones, and average 0 to 80 percent by volume.

The A horizon has dry color of 10YR 4/3, 5/2, 5/3 or 6/3; moist color is 10YR 2/2, 3/2, 3/3, 4/2 or 4/3. It is sand or loamy sand, with 1 to 5 percent clay. Rock fragments are 0 to 5 percent gravel and 0 to 2 percent cobbles, and 0 to 8 percent by volume. Reaction is slightly acid to neutral.

The C horizon has dry color of 10YR 4/1, 4/3, 5/2, 5/3, 6/3 or 6/4; moist color is 10YR 3/1, 3/2, 3/3, 4/2,

6/6, or 7/6. It is coarse sand, sand, loamy coarse sand or loamy sand, with 0 to 5 percent clay. Mottles are present and tend to be 10YR 6/6, 6/7 or 6/8 dry, and 5YR 4/6, 5/6 or 5/8 moist. Rock fragments are 0 to

60 percent gravel, 0 to 15 percent cobbles and 0 to 10 percent stones, and 0 to 80 percent by volume. Reaction is strongly acid.

AQUIC HAPLOXEROLLS

These Aquic Haploxerolls soils consist of deep, poorly drained soils forming in material weathering from mixed alluvium. These soils are in upland meadows, and have slopes of 0 to 9 percent. Elevation is 7,200 to 8,800 feet. The mean annual precipitation is about 13 to 18 inches, and the mean annual temperature is about 45°F.

Taxonomic Class: Aquic Haploxerolls.

Typical Pedon: The representative profile for this soil is in an upland meadow, under grasses and sedges, at an elevation of 7,500 feet. Colors are for dry dry soil unless otherwise noted.

Oa – 3 to 0 inches; grass litter and a thick matting of grass roots; clear smooth boundary.

A1 – 0 to 10 inches; gray (10YR 5/1) gravelly loamy sand, very dark gray (10YR 3/1) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; few very fine interstitial pores; 20 percent gravel; slightly acid (pH 6.3); clear wavy boundary.

A2 – 10 to 28 inches; gray (10YR 6/1) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many fine and medium roots; many fine interstitial pores; 20 percent gravel and 5 percent cobbles; slightly acid (pH 6.5), abrupt wavy boundary.

2Ab – 28 to 60 inches; brown (10YR 5/3) gravelly loamy coarse sand, dark brown (10YR 3/3) moist, with common to many fine distinct yellowish and reddish brown mottles (5YR 4/6 and 5YR 4/4 moist); single

grain; loose, nonsticky and nonplastic; common fine and medium roots; many fine interstitial pores; 30 percent gravel and 5 percent cobbles; neutral (pH 6.7).

Type Location: About 550 feet south and 75 feet east of the northwest corner of the northeast quarter of the northwest quarter of Section 17, T.1S., R.26E., MDBM, Mono Craters SW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 38°F, and the mean summer soil temperature is about 55°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. Depth to the apparent water table is 8 to 28 inches. The 10 to 40 inch textural control section is loamy sand or loamy coarse sand, with 1 to 3 percent clay. Rock fragments are 10 to 30 percent gravel and 0 to 5 percent cobbles, and average 12 to 26 percent by volume.

Some pedons have C horizons.

The surface A horizon has dry color of 10YR 5/1 or 5/2; moist color is 10YR 3/1 or 3/2. It is loamy sand, with 1 to 3 percent clay. Rock fragments are 10 to 20 percent gravel by volume. Reaction is slightly acid.

The other A horizons have dry color of 10YR 5/3 or 6/1; moist color is 10YR 3/2, 3/3 or 4/3, and mottles are 5YR 4/6 dry and 5YR 4/4 moist. They are loamy sand or loamy coarse sand, with 1 to 3 percent clay. Rock fragments are 10 to 30 percent gravel and 0 to 5 percent cobbles by volume. Reaction is slightly acid to neutral.

ARIZO FAMILY

The Arizo family consists of very deep, excessively drained soils forming in mixed alluvium. These soils are on alluvial fans and fan terraces, and have slopes of 0 to 15 percent. Elevation is 3,700 to 4,000 feet. The mean annual precipitation is about 4 to 7 inches, and the mean annual temperature is about 57 to 71°F.

Taxonomic Class: Sandy-skeletal, mixed, thermic Typic Torriorthents

Typical Pedon: The representative profile for this soil is on an east-facing alluvial fan, under white bursage, spiny hopsage, schadscale and desert needlegrass, at an elevation of 3,800 feet. Slope is 4 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 4 inches; pale brown (10YR 6/3) gravelly loamy sand, brown (10YR 4/3) moist; weak medium sub-angular blocky structure; soft, very friable, non-sticky and nonplastic; few very fine roots; many very fine interstitial pores; 15 percent gravel, 5 percent cobbles, 1 percent stones and 2 percent boulders; slightly alkaline (pH 7.5); clear wavy boundary.

C – 4 to 60 inches; pale brown (10YR 6/3) very stony loamy sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine interstitial and few very fine tubular pores; 10 percent gravel, 15 percent cobbles and 15 percent stones; slightly alkaline (pH 7.5).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 3.5 miles north of Olancho, and 30

feet north of the dirt road branching off the aqueduct road; about 2,600 feet east and 1,200 feet north of the southwest corner of Section 25, T.18S., R.36E., MDBM, Olancho Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 63°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. Rock fragments tend to be rounded or have rounded edges. The surface rock fragment coverage ranges from 20 to 90 percent, with 20 to 50 percent gravel, 1 to 20 percent cobbles and 3 to 15 percent stones and boulders. Some boulders exceed 6 feet in diameter. The 10 to 40 inch textural control section is loamy sand. Rock fragments are 5 to 30 percent gravel, 10 to 20 percent cobbles and 0 to 50 percent boulders, and average 35 to 60 percent by volume. The soil is slightly to moderately alkaline.

Some pedons have disseminated carbonates that weakly effervesce.

The A horizon has dry color of 10YR 7/2 or 6/3; moist color is 10YR 4/2, 4/3 or 5/3. Rock fragments range from 0 to 35 percent by volume, and include 0 to 3 percent cobbles. Texture is gravelly loamy sand. Some profiles have thin fragile layers just below the surface that have vesicular pores.

The C horizon has dry color of 10YR 7/2, 7/3, 6/3 or 6/4; moist color is 10YR 4/3, 4/4 or 5/3. Textures are loamy sand, with gravelly, very gravelly or very stony modifiers. Some pedons have a stratified C horizon.

ARTRAY FAMILY

The Artray family consists of very deep, poorly drained soils forming in mixed alluvium influenced by volcanic ash. These soils are on alluvial fans and lakeshore terraces, and have slopes of 0 to 9 percent. Elevation is 6,900 to 8,400 feet. The mean annual precipitation is about 8 to 16 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Coarse-loamy, mixed, mesic Cumulic Endoaquolls

Typical Pedon: The representative profile for this soil is on a south-facing alluvial fan, under grasses, sedges, willows and wildrose, at an elevation of 6,800 feet. Slope is 5 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 4 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine tubular and interstitial pores; 5 percent gravel; slightly acid (pH 6.2); abrupt smooth boundary.

A2 – 4 to 12 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and common medium roots; many very fine, fine and medium interstitial, and common very fine tubular pores; 15 percent gravel; neutral (pH 6.7); clear wavy boundary.

A3 – 12 to 28 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark brown (10YR 2/2) moist; few fine distinct dark yellowish brown (10YR 4/4) masses of iron accumulations lining roots and pores; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine, and few medium roots; many very fine and fine interstitial, and common very fine tubular pores; 15 percent gravel; neutral (pH 6.8); clear wavy boundary.

C1 – 28 to 42 inches; light brownish gray (10YR 6/2) gravelly sandy loam, olive gray (5Y 4/2) moist;

massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and fine interstitial, and common very fine tubular pores; 20 percent gravel; neutral (pH 6.6); abrupt wavy boundary.

C2 – 42 to 60 inches; white (5Y 8/1) gravelly coarse sandy loam, greenish gray (5GY 5/1) moist; common medium distinct dark yellowish brown (10YR 4/4) masses of iron accumulations; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many fine and medium interstitial pores; 25 percent gravel; slightly alkaline (pH 7.6).

Type Location: In the Bodie-Coleville Soil Survey Area, about 0.25 mile southwest of Conway Ranch; 530 feet east and 530 feet south of the northwest corner of Section 6, T.2N., R.26E., MDBM, Bodie Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 53°F. The mean summer soil temperature is about 69°F and the mean winter soil temperature is about 36°F. Depth to the apparent watertable is 6 inches to 4 feet. The 10 to 40 inch textural control section is loam, sandy loam or coarse sandy loam. Rock fragments are mostly gravel, and average 5 to 30 percent by volume.

The A horizon has dry color of 10YR 4/2 or 5/2; moist color is 10YR 2/2 or 3/2. It has few to common, distinct to prominent masses of iron accumulations. It is loam, very fine sandy loam, sandy loam, gravelly sandy loam or cobbly sandy loam. Rock fragments are 0 to 25 percent gravel by volume. Reaction is slightly acid to neutral.

The C horizon has dry color of 10YR 6/2, or 2.5Y 6/2 or 5Y 8/1; moist color is 10YR 4/2, or 2.5Y 4/2, or 5Y 4/2 or 5GY 5/1. This horizon has common or many masses of iron accumulations. It is gravelly sandy clay loam, loam, sandy loam, gravelly sandy loam or gravelly coarse sandy loam. Rock fragments, mostly gravel, are 10 to 30 percent by volume. Strata of loamy sand to very cobbly loamy sand are common. Cobbly substratum soils have very gravelly coarse sandy loam textures. Rock fragments are 35 to 60 percent by volume, and include 15 to 25 percent cobbles. Reaction is neutral to slightly alkaline.

ATTER FAMILY

The Atter family consists of moderately deep and deep, somewhat excessively drained soils forming in material weathering from granitic and mixed rocks. These soils are on mountainsides, hillsides and canyon sideslopes, and have slopes of 15 to 90 percent. Elevation is 5,900 to 10,200 feet. The mean annual precipitation is about 4 to 25 inches, and the mean annual temperature is about 43°F.

Taxonomic Class: Sandy-skeletal, mixed, mesic Typic Xerorthents.

Typical Pedon: The representative pedon for this soil is on an east-facing terminal moraine, under big sagebrush, antelope bitterbrush, rabbitbrush, Indian ricegrass and buckwheat, at an elevation of 6,800 feet. Slope is 40 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 2 inches; brown (10YR 5/3) extremely stony sandy loam, very dark brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial and many fine tubular pores; 20 percent gravel, 15 percent cobbles, 30 percent stones and 15 percent boulder; slightly acid (pH 6.4); clear wavy boundary.

C1 – 2 to 10 inches; weak red (2.5YR 5/2) extremely stony loamy sand, weak red (2.5YR 4/2) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine tubular and many medium interstitial pores; 20 percent gravel, 15 percent cobbles, 30 percent cobbles and 15 percent boulders; neutral (pH 6.6); gradual smooth boundary.

C2 – 10 to 16 inches; pale red (2.5YR 6/2) extremely stony loamy sand, olive (5Y 5/3) moist; strong medium subangular blocky grading to strong fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine and common fine roots; few fine tubular and many medium interstitial pores; 20 percent gravel, 15 percent cobbles, 30 percent stones and 15 percent boulders; neutral (6.6); gradual smooth boundary.

C3 – 16 to 29 inches; pale red (2.5YR 6/2) extremely stony loamy sand, olive (5Y 4/3) moist; strong coarse subangular blocky grading to strong fine

and medium subangular blocky structure; hard, friable, nonsticky and nonplastic; many very fine and common fine roots; few fine tubular and many medium interstitial pores; 20 percent gravel, 15 percent cobbles, 30 percent stones and 15 percent boulders. slightly acid (pH 6.5); clear wavy boundary.

C4 – 29 to 44 inches; pale red (2.5YR 6/2) extremely stony loamy sand, olive (5Y 4/3) moist; massive; loose, nonsticky and nonplastic; many very fine roots; few fine tubular and many medium interstitial pores; 20 percent gravel, 15 percent cobbles, 30 percent stones and 15 percent boulders; slightly acid (pH 6.4); gradual wavy boundary.

Cr – 44 inches; granitic glacial till

Type Location: About 0.6 miles south on Lower Rock Creek road from intersection with Highway 395; at 200 feet west of road shoulder; northwest corner of northwest corner of Sec. 2, T.5S., R.30E., MDBM, Casa Diablo SW Quadrangle.

Range in Characteristics: Soil depth can range from 30 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 48°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The soil is usually dry from mid-April to late November, and is usually moist in some parts for the rest of the year. The 10 to 40 inch textural control section is loamy sand, with 1 to 3 percent clay. Rock fragments are 10 to 30 percent gravel, 0 to 20 percent cobbles, 0 to 40 percent stones and 0 to 25 percent boulders, and average 40 to 90 percent by volume.

The A horizon has dry color of 10YR 4/3, 5/2, 5/3, 6/2 or 6/3; moist color is 10YR 3/2, 3/3, 4/2, 4/3 or 4/4. It is a sandy loam, with 2 to 5 percent clay. Rock fragments are 10 to 30 percent gravel, 0 to 20 percent cobbles, 0 to 40 percent stones and 0 to 25 percent boulders by volume. Reaction is slightly acid to neutral.

The C horizon has dry color of 2.5YR 4/2, 5/2, 5/3, 6/2 or 6/3; moist color is 5Y 3/3, 4/3, 4/2, 5/3, 5/2 or 6/3. It is loamy sand, with 1 to 3 percent clay. Rock fragments are 10 to 30 percent gravel, 0 to 20 percent cobbles, 0 to 40 percent stones and 0 to 25 percent boulders by volume. Reaction is slightly acid to neutral.

AVALMOUNT FAMILY

The Avalmount family consists of very deep, well drained soils forming in volcanic cinders and lava. These soils are on cinder cones and lava flows, and have slopes of 5 to 30 percent. Elevation is 6,400 to 6,700 feet. The mean annual precipitation is about 6 to 10 inches, and mean annual temperature is about 50°F.

Taxonomic Class: Ashy-skeletal, mesic Vitrixerandic Haplocambids

Typical Pedon: The representative profile for this soil is on a northeast-facing lava flow, under big sagebrush and buckwheat, at an elevation of 5,150 feet. Slope is 14 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 10 inches; brown (10YR 5/3) very gravelly fine sandy loam, dark brown (10YR 3/3) moist; weak coarse and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and few fine and medium roots; common very fine interstitial and few very fine tubular pores; 35 percent pebbles, 15 percent cobbles, and 2 percent stones; neutral (pH 7.3); gradual wavy boundary.

2Bw1 – 10 to 30 inches; dark yellowish brown (10YR 4/4) very cobbly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and nonplastic; few very fine, fine, and medium roots; common very fine and fine tubular pores; 20 percent pebbles, 25 percent cobbles, and 10 percent stones; neutral (pH 7.2); clear wavy boundary.

3Bw2 – 30 to 60 inches; yellowish brown (10YR 5/4) extremely stony very fine sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky

structure; slightly hard, very friable, slightly sticky and nonplastic; few very fine, fine and medium roots; common very fine interstitial and tubular pores; 20 percent pebbles, 20 percent cobbles, and 25 percent stones; neutral (pH 7.1).

Type Location: In the Benton-Owens Soil Survey Area, about 3 miles southwest of Big Pine on Crater Mountain lava flow; 1,400 feet north and 650 feet east of the SW corner of Sec. 9, T.9S., R.33E., MDBM, Big Pine Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual temperature at 20 inches is about 57°F. The difference between the mean summer and mean winter soil temperature is greater than 9°F. The soil from a depth of 10 to 40 inches contains 35 to 80 percent cinders. Rock fragments constitute 35 to 80 percent of the textural control section by volume. These are low intensity basalt cinders which are very jagged and interlock to some extent. A gravel, cobble, and stone pavement covers 40 to 60 percent of the soil surface. Reaction is neutral.

The A horizon has color of 10YR 6/3 or 5/3 and moist color of 10YR 4/3 or 3/3. It is very gravelly fine sandy loam. It contains 35 to 60 percent cinders consisting of 30 to 50 percent pebbles, 5 to 20 percent cobbles, and 1 to 3 percent stones. The organic carbon content is 0.6 percent.

The Bw horizon has color of 10YR 4/4, 5/4; 7.5YR 4/4 or 5/4 and moist color of 10YR 4/3, 3/3 or 3/4. It is very cobbly loam or extremely stony very fine sandy loam. Rock fragments are 20 to 40 percent pebbles, 15 to 40 percent cobbles, and 0 to 30 percent stones. Thin clay films are evident in some pedons.

BAIRS FAMILY

The Bairs family consists of very deep, well drained soils forming from granitic and mixed alluvium. These soils are on bouldery or stony alluvial fans and fan terraces, and have slopes of 15 to 50 percent. Elevation is 4,600 to 6,800 feet. The mean annual precipitation is about 6 to 12 inches, and the mean annual temperature is about 55°F.

Taxonomic Class: Loamy-skeletal, mixed, mesic Xeric Haplagrids

Typical Pedon: The representative profile for this soil is on east-facing alluvial fan, under big sagebrush, desert bitterbrush and desert needlegrass, at an elevation of 6,100 feet. Slope is 8 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 7 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; common fine roots; many very fine interstitial pores; 20 percent gravel and 1 percent cobbles; slightly acid (pH 6.5); abrupt smooth boundary.

A2 – 7 to 20 inches; brown (10YR 5/3) gravelly loamy coarse sand, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine interstitial pores; 20 percent gravel, 2 percent stones and 1 percent boulders; neutral (pH 7.0); clear wavy boundary.

Bt1 – 20 to 31 inches; brown (10YR 5/3) very stony sandy loam, dark brown (10YR 3/3) moist; weak coarse angular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; few very fine interstitial and tubular pores; few thin clay films bridging mineral grains; 10 percent gravel, 10 percent cobbles, 15 percent stones and 1 percent boulders; neutral (pH 7.0); clear wavy boundary.

Bt2 – 31 to 44 inches; yellowish brown (10YR 5/4) very stony sandy loam, dark yellowish brown (10YR 3/4) moist; weak coarse angular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and medium roots; few very fine tubular pores; common thin clay films bridging mineral grains; 10 percent gravel, 10 percent cobbles, 20 percent stones and 2 percent boulders; neutral (pH 7.0); clear wavy boundary.

C – 44 to 60 inches; very pale brown (10YR 7/4) very stony loamy coarse sand, yellowish brown (10YR 5/4) moist; massive; hard, friable, nonsticky and nonplastic; few very fine roots; 10 percent gravel, 45 percent stones and 5 percent boulders; slightly acid (pH 6.5).

Type Location: In the Benton-Owens Soil Survey Area, about 20 yards southeast of Hogback Creek Road; about 650 feet west and 1,150 feet north of the southeast corner of Section 19, T.15S., R.35E., MDBM, Lone Pine Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. Depth of the solum is 23 to 45 inches. The mean annual soil temperature at 20 inches is about 57°F. The difference between the mean summer and mean winter soil temperature is greater than 9°F. The textural control section is the whole argillic, if less than 20 inches thick and upper 20 inches of argillic, if greater than 20 inches thick. It is sandy loam or sandy clay loam, with 10 to 18 percent clay. Rock fragments are 10 to 20 percent gravel, 10 to 20 percent cobbles and 5 to 30 percent stones and boulders, and averages 35 to 65 percent by volume. Base saturation is 90 to 100 percent. Reaction is slightly acid to neutral.

The A horizon has dry color of 10YR 5/2, 5/3 or 6/3; moist color is 10YR 3/2, 3/3 or 4/3. It is very gravelly sandy loam or gravelly loamy coarse sand. Rock fragments are 15 to 30 percent gravel and 3 to 15 percent cobbles, stones and boulders, and average 15 to 35 percent by volume. The organic carbon content is 0.4 to 0.6 percent.

The Bt horizon has dry color of 10YR 7/3, 7/4, 6/4, 5/3 or 5/4; moist color is 10YR 3/3, 3/4, 4/3, 4/4 or 5/4. It is very cobbly or very stony sandy loam or sandy clay loam, with 10 to 18 percent clay. Clay films are thin to moderately thick and are few to many. Rock fragments are 10 to 20 percent gravel, 10 to 20 percent cobbles and 5 to 30 percent stones and boulders, and average 35 to 65 percent by volume.

The C horizon has dry color of 10YR 6/3, 7/3 or 7/4; moist color is 10YR 5/4. It is very stony or extremely stony loamy coarse sand. Rock fragment content is similar to that in the Bt horizon.

BASKET FAMILY

The Basket family consists of moderately deep to deep, well drained soils forming in material weathering from metasedimentary rock. These soils are on hillsides, and have slopes of 30 to 60 percent. Elevation is 6,400 to 8,600 feet. The mean annual precipitation is about 10 to 20 inches, and the mean annual temperature is about 47°F.

Taxonomic Class: Loamy-skeletal, mixed, frigid Xeric Haplargids.

Typical Pedon: The representative profile for this soil is on a northeast-facing hillside, under pinyon pine, antelope bitterbrush and big sagebrush, at an elevation of 6,750 feet. Slope is 35 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 2 inches; brown (10YR 5/3) extremely gravelly sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure, parting to weak very fine and fine subangular blocky; soft, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine interstitial pores; 60 percent gravel and 20 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

BE – 2 to 4 inches; brown (10YR 4/3) very gravelly clay loam, brown (10YR 4/3) moist; massive; soft, friable, slightly sticky and slightly plastic; few very fine roots; many very fine interstitial pores; 45 percent gravel and 15 percent cobbles; neutral (pH 6.6); clear wavy boundary.

Bt1 – 4 to 11 inches; dark yellowish brown (10YR 4/4) extremely gravelly clay loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; many very fine and fine, common medium, and few coarse roots; many very fine interstitial pores; few thin clay films on ped faces; 55 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); gradual irregular boundary.

Bt2 – 11 to 25 inches; dark yellowish brown (10YR 4/4) extremely gravelly clay loam, dark yellowish brown (10YR 4/4) moist; massive; hard, firm, sticky and plastic; common very fine and few medium roots;

many very fine interstitial pores; few moderately thick clay films on ped faces; 55 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); gradual irregular boundary.

Bt3 – 25 to 38 inches; yellowish brown (10YR 5/6) very gravelly clay loam, yellowish brown (10YR 5/6) moist; massive; hard, firm, sticky and plastic; few very fine and coarse, and common medium roots; many very fine interstitial pores; common moderately thick clay films on ped faces; 35 percent gravel; slightly acid (pH 6.1); gradual irregular boundary.

Cr – 38 inches; weathering marine sediments, which can be cut with a tile spade.

Type Location: About 660 feet west and 330 feet north of the apparent center of Section 4, T.4S., R.31E., MDBM, Casa Diablo NE Quadrangle.

Range in Characteristics: Soil depth to the paralithic contact is greater than 38 inches. The mean annual soil temperature at 20 inches is about 44°F, and the mean summer soil temperature is about 61°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The textural control section is all of the argillic horizon, or the upper 20 inches of the argillic, whichever is less. It is clay loam, with 27 to 32 percent clay. Rock fragments are 45 to 55 percent gravel and 0 to 10 percent cobbles, and average 45 to 58 percent by volume.

The A horizon has dry color of 10YR 5/3 or 6/3; moist color is 10YR 3/3, 4/2 or 4/3. It is sandy loam, with 2 to 20 percent clay. Rock fragments are 5 to 60 percent gravel, 5 to 20 percent cobbles, and 0 to 5 percent stones by volume. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 4/3, 4/4, 5/6, 5/8, 6/3, 6/4 or 6/6, or 7.5YR 5/6; moist color is 10YR 4/3, 4/4, 5/4, 5/6, or 5/8, or 5YR 5/6. It is clay loam, sandy clay loam or sandy loam, with 18 to 35 percent clay. Rock fragments are 20 to 55 percent gravel and 0 to 25 percent cobbles by volume. Reaction is slightly acid to neutral.

BEARSKIN FAMILY

The Bearskin family consists of shallow, well drained soils forming from granitic, metasedimentary and basalt rocks. These soils are on hillsides and basalt flows, and have slopes of 0 to 90 percent. Elevation is 6,800 to 9,300 feet. The mean annual precipitation is 10 to 20 inches, and the mean annual temperature is about 45°F.

Taxonomic Class: Loamy, mixed frigid Lithic Argixerolls.

Typical Pedon: The representative profile for this soil is on a hilltop, under mountain mahogany and bitterbrush, at an elevation of 8,960 feet. Slope is 1 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 2 inches; brown (10YR 5/3) gravelly loamy fine sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; 25 percent gravel; slightly acid (pH 6.4); clear smooth boundary.

Bt1 – 2 to 5 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine, fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine and fine interstitial pores; few thin clay films on ped faces; 25 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bt2 – 5 to 10 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; moderate very fine, fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine interstitial pores; few thin clay films on ped faces and in pores; 40 percent gravel; slightly acid (pH 6.4); abrupt smooth boundary.

R – 10 inches; hard metasedimentary bedrock.

Type Location: About 825 feet east and 500 feet north of the southwest corner of the southeast quarter of Section 11, T.2S., R.30E., MDBM, Glass Mountain SW Quadrangle.

Range in Characteristics: Soil depth to bedrock is 10 to 20 inches. The mean annual soil temperature at 20 inches or bedrock, whichever is deeper, is about 44°F, and the mean summer soil temperature is about 61°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The textural control section is the whole soil for pedons 14 inches or less deep, and is the whole argillic horizon for pedons deeper than 14 inches. It is clay, sandy clay loam, loam, sandy loam, loamy fine sand, loamy sand, sand or coarse sand, with 2 to 40 percent clay, and a weighted average of 11 to 30 percent clay. Rock fragments are 0 to 55 percent gravel, 0 to 15 percent cobbles and 0 to 15 percent stones, and average 11 to 31 percent by volume.

Some pedons have surface layers with sand or loamy sand textures. Other pedons have C horizons.

The A horizon has dry color of 10YR 4/3, 5/2, 5/3; moist color is 10YR 3/1, 3/2 or 3/3. It is loamy fine sand, loamy sand, loamy coarse sand or coarse sand, with 2 to 4 percent clay. Rock fragments are 10 to 55 percent gravel, 0 to 15 percent cobbles and 0 to 15 percent stones by volume. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 4/3, 4/4, 5/2, 5/3 or 5/4; moist color is 10YR 3/2, 3/3, 3/4, 4/2 or 4/3. It is clay, sandy clay loam, loam or sandy loam, with 8 to 40 percent clay. Rock fragments are 0 to 40 percent gravel, 0 to 15 percent cobbles and 0 to 15 percent stones by volume. Reaction is slightly acid to neutral.

BERENT FAMILY

The Berent family consists of deep, somewhat excessively drained soils forming in material weathering from granitic and basalt rocks. These soils are on mountainsides, hillsides, bench terraces, dissected alluvial fans, toeslopes, depressions and valley bottoms, and have slopes of 0 to 60 percent. Elevation is 4,000 to 8,800 feet. The mean annual precipitation is about 4 to 20 inches, and the mean annual temperature is about 50°F.

Taxonomic Class: Mixed, mesic Xeric Torripsamments

Typical Pedon: The representative profile for this soil is on a hillside, under a community of rabbitbrush, Mormon tea, fourwing saltbrush, spiny hopsage, and scattered bunchgrasses, at an elevation of 5,850 feet. Slope is 27 percent. Colors are for dry soil unless otherwise noted.

- A1 – 0 to 4 inches; light yellowish brown (10YR 6/4) loamy sand, brown (10YR 4/3) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 13 percent gravel; slightly alkaline (pH 7.4); clear smooth boundary.
- C1 – 4 to 26 inches; light yellowish brown (10YR 6/4) loamy sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 10 percent gravel; neutral (pH 7.2); gradual smooth boundary.
- C2 – 26 to 60 inches; light yellowish brown (10YR 6/4) sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores;

5 percent gravel; neutral (pH 7.1).

Type Location: About 100 feet past the road junction and 1/4 mile past the Forest Service boundary; about 900 feet east and 1,325 feet south of the northwest corner of Section 29, T.7S., R.32E., MDBM, Bishop Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The soil moisture control section is 13 to 60 inches. It is usually dry in all parts from late April to late November, and is usually moist in some parts the rest of the year. The 10 to 40 inch textural control section is loamy sand, loamy coarse sand, loamy fine sand, or sand, with 1 to 5 percent clay. Rock fragments are 5 to 25 percent gravel, 0 to 5 percent cobbles and 0 to 5 percent stones, and average 7 to 18 percent by volume.

Some pedons have sand surface textures.

The A horizon has dry color of 10YR 5/3, 5/4, 6/3, or 6/4; moist color is 10YR 3/2, 4/3, or 5/4. It is loamy sand or loamy coarse sand, with 1 to 3 percent clay. Rock fragments are 5 to 35 percent gravel, 0 to 20 percent cobbles, and 0 to 5 percent stones by volume. Reaction is neutral to slightly alkaline.

The C horizon has dry color of 10YR 5/4, 5/6, 6/3, or 6/4; moist color is 10YR 3/3, 4/3, 4/4, or 5/4. It is loamy fine sand, loamy sand, loamy coarse sand or sand, with 1 to 5 percent clay. Rock fragments are 5 to 25 percent gravel, 0 to 5 percent cobbles, and 0 to 5 percent stones by volume. Reaction is neutral.

BIGLAKE FAMILY

The Biglake family consists of moderately deep to deep, somewhat excessively drained soils forming from rhyolite, mixed and glacial till rock sources. These soils are on mountainsides, moraines and alluvial bottoms, and have slopes of 0 to 70 percent. Elevation is 6,800 to 11,000 feet. The mean annual precipitation is 12 to 25 inches, and the mean annual temperature is about 44°F.

Taxonomic Class: Sandy-skeletal, mixed, frigid Typic Haploxerolls

Typical Pedon: The representative profile for this soil is on a west by southwest-facing mountainside, under Jeffrey pine, red fir, antelope bitterbrush and big sagebrush, at an elevation of 8,080 feet. Slope is 22 percent. When described (8/22/85), the soil was moist throughout. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; grayish brown (10YR 5/2) coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine and fine interstitial pores; 7 percent gravel; moderate acid (pH 6.0); clear wavy boundary.

A2 – 2 to 11 inches; brown (10YR 5/3) coarse sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; many very fine and fine interstitial pores; 8 percent gravel; neutral (pH 7.0); gradual wavy boundary.

A3 – 11 to 15 inches; brown (10YR 5/3) coarse sand, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium, coarse and very coarse roots; many very fine and fine, and common medium interstitial pores; 13 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bw1 – 15 to 33 inches; brown (10YR 5/3) gravelly coarse sand, brown (10YR 4/3) moist; weak and moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium, coarse and very coarse roots; many very fine and fine interstitial pores; 18 percent gravel and 10 percent cobbles; neutral (pH 7.0); clear wavy boundary.

Bw2 – 33 to 60 inches; yellowish brown (10YR 5/4) ex-

tremely cobbly coarse sand, dark yellowish brown (10YR 4/4) moist; weak and moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine, and common medium and coarse roots; many very fine and fine interstitial pores; 32 percent gravel, 40 percent cobbles and 15 percent stones; neutral (pH 7.0).

Type Location: About 1.95 miles north on Forest Service Road 3S25, from its intersection with Highway 203, then 0.45 mile on the east fork, then 1.0 mile on the east fork, then 0.15 mile on the east fork, then 0.35 mile on the south fork, and 120 feet upslope, on the east side of the road; about 330 feet west and 500 feet north of the southeast corner of the southwest quarter of Section 24, T.3S., R.27E., MDBM, Mt. Morrison NW Quadrangle.

Range in Characteristics: Soil depth is 36 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 44°F, and the mean summer soil temperature is about 61°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The textural control section is from 10 inches to the paralithic contact in pedons shallower than 40 inches, and is the 10 to 40 inch section in pedons deeper than 40 inches. It is sandy loam, loamy sand or coarse sand, with 1 to 8 percent clay. Rock fragments are 8 to 40 percent gravel, 0 to 40 percent cobbles, 0 to 40 percent stones and 0 to 20 percent boulders, and average 36 to 80 percent by volume.

Some pedons have surface layers with sand textures. Other pedons have C horizons, and some have duripans at depths greater than 40 inches.

The surface A horizon has dry color of 10YR 4/2, 5/2 or 5/3; moist color is 10YR 3/1, 3/2 or 3/3. It is very fine sandy loam, loamy sand or coarse sand, with 1 to 4 percent clay. Rock fragments are 2 to 35 percent gravel, 0 to 20 percent cobbles, 0 to 30 percent stones and 0 to 20 percent boulders by volume. Reaction is moderate to slightly acid.

The underlying A horizons have dry color of 10YR 4/2, 5/3 or 5/4; moist color is 10YR 3/1, 3/2, 3/3, 3/4 or 4/3. They are sandy loam, loamy sand or coarse sand, with 1 to 6 percent clay. Rock fragments are 8 to 35 percent gravel, 0 to 25 percent cobbles, 0 to 40 percent stones and 0 to 20 percent boulders by volume. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 5/3, 5/4, 6/3 or 6/4, or 2.5Y 6/4; moist color is 10YR 3/4, 4/3 or 4/4, or 2.5Y 3/2. It is loamy sand or coarse sand, with 2 to 8 percent clay. Rock fragments are 10 to 40 percent gravel, 0 to 40 percent cobbles, 0 to 30 percent stones and 0 to 20 percent boulders by volume. Reaction is slightly acid to neutral.

The pedons with C horizons have dry color of 10YR 4/3, 5/3, 5/4, 6/3 or 6/4; moist color is 10YR 3/2 or 4/4, or 2.5Y 3/2. It is loamy sand or coarse sand, with 1 to 3 percent clay. Rock fragments are 10 to 37 percent gravel, 0 to 25 percent cobbles, 0 to 40 percent stones and 0 to 20 percent boulders by volume. Reaction is slightly acid to neutral.

BRANTEL FAMILY

The Brantel family consists of deep, somewhat excessively drained soils forming in material weathering from pumice and tuff. These soils are on hillsides, hilltops, lake terraces, upland flats, upland valleys and depressions, and on dissected alluvial fans, and have slopes of 0 to 60 percent. Elevation is 6,400 to 9,300 feet. The mean annual precipitation is about 6 to 25 inches, and the mean annual temperature is about 45°F

Taxonomic Class: Ashy, mesic Vitrandic Torripsamments

Typical Pedon: The representative profile for this soil is on a north-by-northeast-facing lake terrace under basin big sagebrush and antelope bitterbrush, at an elevation of 6,600 feet. Slope is 7 percent. When described (7/22/85), the soil was slightly moist in the 49 to 53 inch section, and dry in the remainder of the profile. Colors are for dry soil unless otherwise noted.

A1 – 0 to 3 inches; light brownish gray (10YR 6/2) coarse sand, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 8 percent pumice and obsidian gravel, 2 to 40 mm in diameter; very strongly acid (pH 5.0); clear wavy boundary.

A2 – 3 to 9 inches; light gray (10YR 7/2) gravelly loamy coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium, and common coarse and very coarse roots; many very fine and fine interstitial pores; 20 percent pumice and obsidian gravel, 2 to 20 mm in diameter; very strongly acid (pH 4.9); abrupt wavy boundary.

2C1 – 9 to 25 inches; white (10YR 8/1) gravelly coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 18 percent pumice and obsidian gravel; 2 to 20 mm in diameter; strongly acid (pH 5.5); abrupt wavy boundary.

3C2 – 25 to 42 inches; white (10YR 8/1) gravelly loamy coarse sand, gray (10YR 6/1) moist; very weak very fine and fine platy structure; soft, very friable, nonsticky and nonplastic; few fine and medium, and common coarse and very coarse roots; many very fine and fine interstitial pores; 29 percent pumice

gravel, 2 to 20 mm in diameter; strongly acid (pH 5.5); abrupt smooth boundary.

4C3 – 42 to 47 inches; variegated white (10YR 8/1) and black (N2/0) pumice and obsidian gravel, 2 to 40 mm in diameter, light gray (10YR 7/1) and very dark gray (N3/0) moist; single grain; loose, nonsticky and nonplastic; many coarse interstitial pores; neutral (pH 7.2); abrupt smooth boundary.

5C4 – 47 to 48 inches; light gray (10YR 7/1) gravelly loamy coarse sand, grayish brown (10YR 5/2) moist; moderate coarse and very coarse platy structure; soft, very friable, nonsticky and nonplastic; many very fine and fine interstitial pores; 15 percent pumice and obsidian gravel, 2 to 20 mm in diameter; slightly acid (pH 6.1); abrupt smooth boundary.

6C5 – 48 to 49 inches; variegated white (10YR 8/1) and dark gray (N4/0) pumice and obsidian gravel, 2 to 40 mm in diameter, light gray (10YR 7/1) and very dark gray (N3/0) moist; single grain; loose, nonsticky and nonplastic; many coarse interstitial pores; slightly acid (pH 6.1); abrupt smooth boundary.

7C6 – 49 to 53 inches; light gray (10YR 7/1) gravelly loamy coarse sand, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine interstitial pores; 25 percent pumice and obsidian gravel, 2 to 20 mm in diameter; slightly acid (pH 6.1); abrupt smooth boundary.

8C7 – 53 to 60 inches; variegated white (10YR 8/1) and dark gray (N4/0) very gravelly coarse sand, light gray (10YR 7/1) and very dark gray (N3/0) moist; single grain; loose, nonsticky and nonplastic; many fine and medium interstitial pores; 44 percent pumice and obsidian gravel, 2 to 40 mm in diameter; slightly acid (pH 6.1).

Type Location: About 5.15 miles east on Highway 120, from its intersection with Highway 395, on the south shoulder of the road; about 1,650 feet west of the northeast corner of Section 29, T.1N., R.27E., MDBM, Mono Craters NE Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil

temperature is about 65°F, and the mean winter soil temperature is about 36°F. It is usually dry from May to late November, and is usually moist in some part the rest of the year. The 10 to 40 inch textural control section is loamy fine sand, loamy sand, loamy coarse sand, sand or coarse sand, with 0 to 8 percent clay. Rock fragments are pumice, obsidian and some rhyolitic and tuff gravel, and average 3 to 30 percent by volume.

Some pedons have surface layers with loamy fine sand textures. Other pedons are less than 40 inches deep to bedrock.

The A1 horizon has dry color of 10YR 5/1, 5/2, 6/2 or 6/3; moist color is 10YR 3/2, 3/3, 4/1, 4/2 or 4/3. It is loamy sand, sand or coarse sand, with 0 to 3 percent clay. Rock fragments are 3 to 35 percent pumice and obsidian gravel by volume, and are dominated by

pumice. Reaction is very strongly to slightly acid.

The other A horizons have dry color of 10YR 5/2, 5/3, 6/2, 7/2, 7/3 or 8/2; moist color is 10YR 3/2, 3/3, 4/2, 4/3 or 5/3. It is loamy sand, loamy coarse sand, sand or coarse sand, with 1 to 8 percent clay. Rock fragments are 3 to 25 percent pumice and obsidian gravel by volume. Reaction is very strongly acid to neutral.

The C horizon has dry color of N2/0 or N4/0, or 10YR 5/3, 5/4, 6/2, 6/3, 7/1, 7/2, 7/3, 8/1 or 8/2; moist color is N3/0, or 10YR 3/2, 3/3, 4/2, 4/3, 4/4, 5/2, 5/3, 6/1, 6/2, 7/1, 7/2 or 7/4. It is loamy fine sand, loamy sand, loamy coarse sand, sand, coarse sand or gravel, with 0 to 6 percent clay. Rock fragments are 3 to 100 percent pumice and obsidian, and some rhyolitic and tuff gravel, by volume. Reaction is strongly acid to slightly alkaline.

BUSCONES FAMILY

The Buscones family consists of moderately deep, somewhat excessively drained soils forming from soft rhyolitic tuff and volcanic ash. These soils are on hillsides and volcanic flows, and have slopes of 0 to 15 percent. Elevation is 5,700 to 7,600 feet. The mean annual precipitation is about 6 to 12 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Ashy, mesic Vitrandic Torripsamments

Typical Pedon: The representative profile for this soil is on a southwest-facing hillside, under big sagebrush, desert needlegrass and rabbitbrush, at an elevation of 5,800 feet. Slope is 10 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 1 inch; light gray (10YR 7/2) very gravelly loamy sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; 40 percent pumice gravel; neutral (pH 6.9); abrupt smooth boundary.

A2 – 1 to 2 inches; light gray (10YR 7/2) loamy sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; 5 percent pumice gravel; neutral (pH 6.9); clear wavy boundary.

A3 – 2 to 18 inches; light gray (10YR 7/2) loamy sand, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; many very fine interstitial pores; 5 percent pumice gravel; neutral (pH 6.9); gradual smooth boundary.

C – 18 to 31 inches; white (10YR 8/2) gravelly loamy sand, light brownish gray (10YR 6/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial

pores; 15 percent fine and medium pumice gravel; neutral (pH 6.8); abrupt wavy boundary.

Cr – 31 inches; white (N 8/0) weakly consolidated rhyolitic tuff; slightly hard; 25 percent pumice gravel.

Type Location: In the Benton-Owens Valley Soil Survey Area, about 1.75 miles north of the Benton Hot Springs; about 2,700 feet east and 100 feet north of the southwest corner of Section 26, T.1S., R.31E., MDBM, Glass Mountain Quadrangle.

Range in Characteristics: Soil depth to soft tuff is 20 to 40 inches. The mean annual soil temperature at 20 inches is about 55°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The textural control section is the 10 inch to paralithic contact or the 40 inch depth, whichever is deeper. It is gravelly loamy sand, with 0 to 3 percent clay. Rock fragments are pumice gravel, and average 5 to 15 percent by volume. Base saturation is 90 to 100 percent throughout the soil profile. The moist bulk density is 1.3 to 1.45 g/cc and the dry bulk density is 1.1 to 1.25 g/cc. Ash content is 60 to 100 percent by weight.

The A horizon has dry color of 10YR 6/2, 6/3 or 7/2; moist color is 10YR 4/2, 4/3 or 5/2. It is loamy sand, gravelly loamy sand or very gravelly loamy sand. Rock fragments are mostly gravel, and average 15 to 50 percent for the surface and 5 to 15 percent by volume in the lower A horizon. The gravel is mostly pumice. The organic carbon content is 0.1 to 0.3. Reaction is neutral.

The C horizon has dry color of 7.5YR 8/2, or 10YR 8/1, 8/2, 7/2 or 6/4; moist color is 7.5YR 6/2, or 10YR 6/1, 6/2, 5/2 or 4/3. It is loamy sand or gravelly loamy sand. Rock fragments are gravel, and average 5 to 30 percent by volume. The gravel is mostly pumice. Reaction is neutral.

CAJON FAMILY

The Cajon family consists of very deep, somewhat excessively drained soils forming in alluvium from granitic rocks. These soils are on alluvial fans and bench terraces, and have slopes of 0 to 15 percent. Elevation is 3,700 to 4,000 feet. The mean annual precipitation is about 4 to 7 inches, and the mean annual temperature is about 59°F.

Taxonomic Class: Mixed, thermic Typic Torripsamments

Typical Pedon: The representative profile for this soil is on an east-facing alluvial fan, under schadscale and desert needlegrass, at an elevation of 3,700 feet. Slope is 10 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 1 inch; very pale brown (10YR 7/3) gravelly loamy sand, brown (10YR 5/3) moist; weak fine platy structure; loose, nonsticky and nonplastic; few very fine roots; 30 percent gravel, 2 to 20 mm in diameter; moderately alkaline (pH 8.0); abrupt smooth boundary.

A2 – 1 to 3 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 4/3) moist; weak fine subangular blocky structure, parting to single grain; loose, nonsticky and nonplastic; common very fine and few medium roots; 5 percent gravel, 2 to 20 mm in diameter; moderately alkaline (pH 8.0); clear wavy boundary.

A3 – 3 to 11 inches; pale brown (10YR 6/3) gravelly loamy sand, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure, parting to single grain; loose, nonsticky and nonplastic; common very fine and fine, and few medium roots; 15 percent gravel, 2 to 20 mm in diameter; slightly alkaline (pH 7.8); gradual wavy boundary.

C1 – 11 to 19 inches; light yellowish brown (10YR 6/4) gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky and nonplastic; common fine and medium roots; 20 percent gravel, 2 to 20 mm in diameter; slightly alkaline (pH 7.8); gradual wavy boundary.

C2 – 19 to 36 inches; light gray (10YR 7/2) gravelly loamy coarse sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky and nonplastic;

common fine and medium roots; 30 percent gravel, 2 to 20 mm in diameter; slightly alkaline (pH 7.6); gradual wavy boundary.

C3 – 36 to 55 inches; light gray (10YR 7/2) loamy sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; few fine and medium roots; 12 percent gravel, 2 to 20 mm in diameter; slightly alkaline (pH 7.8); clear wavy boundary.

C4 – 55 to 70 inches; variegated light gray, brownish yellow and yellow (10YR 7/2, 6/6 and 8/8) sand, variegated brown, brownish yellow and light gray (10YR 5/3, 6/6 and 7/2) moist; single grain; loose, nonsticky and nonplastic; few fine roots; 5 percent gravel, 2 to 20 mm in diameter; slightly alkaline (pH 7.8).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 13 miles south of Lone Pine via Highway 395; about 0.4 mile south of bridge over Cottonwood Creek, turn east on dirt road, take north fork at the Y, travel about 0.45 miles to an intersection with another dirt road, turn north, travel about 0.20 mile, and pit is 20 yards east; about 100 feet west and 3,700 feet south of the northeast corner of projected Section 36, T.17S., R.36E., in an unsectioned area, MDBM, Olancho Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The thickness of the solum is 2 to 25 inches. The mean annual soil temperature at 20 inches is about 62°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The 10 to 40 inch textural control section is gravelly loamy sand, with 0 to 3 percent clay. Rock fragments are 15 to 25 percent gravel by volume. Reaction is slightly to moderately alkaline. Effervescence commonly is absent or slight with disseminated lime.

Some pedons are strongly effervescent in the lower profile. Other pedons have sandy loam textures or very gravelly or cobbly strata below 40 inches.

The A horizon has dry color of 10YR 5/2, 5/3, 6/2, 6/3 or 7/3; moist color is 10YR 3/4, 4/2, 4/3, 4/4 or 5/3. It is loamy sand, sand, gravelly loamy sand, sand or coarse sand. Rock fragments are 0 to 35 percent by volume, and consist mostly of fine gravel. Salinity ranges from 2 to 16 ds/m.

The C horizon has dry color of 10YR 5/4, 6/3, 6/4, 6/6, 7/2, 7/3 or 8/8; moist color is 10YR 3/4, 4/3, 4/4, 5/2, 5/3, 5/4, 6/6 or 7/2. It is loamy fine sand, loamy sand, loamy coarse sand, cobbly loamy coarse sand, fine sand,

sand, coarse sand or their gravelly equivalents. Rock fragments are 5 to 35 percent by volume, and consist mostly of fine gravel. Weak to strong stratification with varying sand size distributions and rock fragment content is common. Salinity ranges from 2 to 16 ds/m.

CALPINE FAMILY

The Calpine family consists of moderately deep to very deep, well drained soils forming from sedimentary rocks. These soils are on terraces and in valley fill areas, and have slopes of 0 to 30 percent. Elevation is 6,800 to 7,500 feet. The mean annual precipitation is about 8 to 15 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Coarse-loamy, mixed, mesic Aridic Haploxerolls.

Typical Pedon: The representative profile for this soil is on an east-facing terrace, under big sagebrush and grasses, at an elevation of 7,080 feet. Slope is 15 percent. Colors are for dry soil unless otherwise noted.

Oi – 1/4 to 0 inch; decomposed and decomposing big sagebrush leaves and twigs; abrupt wavy boundary.

A – 0 to 9 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine and medium roots; many fine interstitial pores; 20 percent gravel; neutral (pH 6.8); clear wavy boundary.

AC – 9 to 15 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 20 percent gravel; neutral (pH 6.7); abrupt wavy boundary.

Bw1 – 15 to 23 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; massive; hard, friable, nonsticky and nonplastic; few coarse roots; few very fine interstitial pores; 20 percent gravel and 5 percent stones; slightly acid (pH 6.5); clear wavy boundary.

Bw2 – 23 to 39 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; massive; hard, friable, nonsticky and nonplastic; few coarse roots; few very fine interstitial pores; 30

percent gravel and 5 percent stones; slightly acid (pH 6.5); clear wavy boundary.

C1 – 39 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; massive; hard, friable, nonsticky and nonplastic; few coarse roots; few very fine interstitial pores; 30 percent gravel and 5 percent stones; slightly acid (pH 6.5).

Type Location: About 500 feet east and 330 feet north of the southwest corner of the northeast quarter of the northwest quarter of Section 24, T.3S., R.28E., MDBM, Mt. Morrison NE Quadrangle.

Range in Characteristics: Soil depth to bedrock is 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The 10 to 40 inch textural control section is loam or sandy loam, with 5 to 18 percent clay. Rock fragments are 10 to 30 percent gravel and 0 to 5 percent stones, and average 14 to 30 percent by volume. Depths below 15 inches are compacted.

Some pedons lack thin surface organic layers. Other pedons lack C horizons.

The A horizon has dry color of 10YR 5/2 or 5/3; moist color is 10YR 3/2 or 7.5YR 3/2. It is loam or sandy loam, with 3 to 5 percent clay. Rock fragments are 10 to 20 percent gravel by volume. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 5/3 or 6/3, or 2.5Y 6/2; moist color is 10YR 3/3 or 4/3, or 2.5Y 4/2. It is loam or sandy loam, with 5 to 18 percent clay. Rock fragments are 15 to 30 percent gravel and 0 to 5 percent stones by volume. Reaction is slightly acid to neutral.

The C horizon has dry color of 10YR 6/3; moist color is 10YR 4/3. It is sandy loam, with 5 percent clay. Rock fragments are 30 percent gravel and 5 percent stones by volume. Reaction is slightly acid.

CARTAGO FAMILY

The Cartago family consists of very deep, somewhat excessively drained soils forming in granitic alluvium. These soils are on alluvial fans and fan terraces, and have slopes of 5 to 15 percent. Elevation is 3,900 to 6,800 feet. The mean annual precipitation is about 4 to 10 inches, and the mean annual temperature is about 61°F.

Taxonomic Class: Sandy, mixed, thermic Xeric Torriorthents

Typical Pedon: The representative profile for this soil is on an east-facing alluvial fan, under blackbrush, spiny hopsage and desert needlegrass, at an elevation of 4,900 feet. Slope is 7 percent. Colors are for dry soil unless otherwise noted.

A - 0 to 10 inches; light yellowish brown (10YR 6/4) gravelly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine interstitial pores; 15 percent gravel; slightly alkaline (pH 7.8); clear wavy boundary.

C1 - 10 to 27 inches; light yellowish brown (10YR 6/4) loamy coarse sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine and coarse roots; many very fine interstitial pores; 10 percent gravel; slightly alkaline (pH 7.8); gradual wavy boundary.

C2 - 27 to 44 inches; light yellowish brown (10YR 6/4) gravelly loamy coarse sand, with some very gravelly lenses present, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few coarse roots; common very fine interstitial pores; 25 percent gravel and 2 percent cobbles; slightly alkaline (pH 7.8); clear wavy boundary.

C3 - 44 to 60 inches; light yellowish brown (10YR 6/4) very gravelly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 40 percent gravel and 5 percent cobbles; slightly alkaline (pH 7.8).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 4 miles southwest of Lone Pine, California, and 20 feet north of dirt road; about 900 feet east and 2,200 feet north of the southwest corner of Section 7, T.16S., R.36E., MDBM, Lone Pine Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 61°F. The mean summer and mean winter soil temperatures differ by more than 9°F. The 10 to 40 inch textural control section averages loamy coarse sand or coarser. Rock fragments are 10 to 40 percent gravel and 0 to 5 percent cobbles, and average 10 to 45 percent by volume. Reaction is neutral to slightly alkaline.

The A horizon has dry color of 10YR 5/3, 6/2, 6/3, 6/4, 6/5 or 7/3; moist color is 10YR 3/3, 4/2, 4/3, 4/4 or 5/3. It is loamy fine sand, loamy sand, loamy coarse sand, gravelly loamy sand and gravelly loamy coarse sand. Rock fragments are 5 to 35 percent gravel, 0 to 10 percent cobbles and 0 to 3 percent stones and boulders, and average 5 to 35 percent by volume.

The C horizon has dry color of 10YR 5/3, 6/2, 6/3, 6/4 or 7/4; moist color is 10YR 4/3, 4/4 or 5/4. It is loamy stratified loamy sand, loamy coarse sand, gravelly loamy fine sand, gravelly loamy sand, gravelly loamy coarse sand, very gravelly loamy coarse sand and very cobbly loamy coarse sand. Rock fragments are 25 to 40 percent gravel and 2 to 5 percent cobbles, and average 25 to 45 percent by volume. Some very gravelly or very cobbly lenses are present above the 40 inch depth.

CHARCOL FAMILY

The Charcol family consists of deep, well drained soils forming from metasedimentary rock. These soils are on mountainsides, mountain benches, moraines and upland basins, and have slopes of 2 to 70 percent. Elevation is 6,800 to 10,000 feet. The mean annual precipitation is about 10 to 25 inches, and the mean annual temperature is about 42 °F.

Taxonomic Class: Loamy-skeletal, mixed Cryic Pachic Paleborolls

Typical Pedon: The representative profile for this soil is on a south by southeast-facing mountain bench, under low sagebrush and scattered whitebark pine, at an elevation of 9,620 feet. Slope is 12 percent. When described (7/20/87), the soil was dry in the upper 10 inches, and slightly moist throughout the rest of the profile. Colors are for dry soil unless otherwise noted.

Oe – 1 to 0 inch; decomposing big sagebrush plant parts; abrupt smooth boundary.

A1 – 0 to 2 inches; brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak to moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine and fine interstitial pores; 25 percent gravel and 3 percent cobbles; neutral (pH 7.0); clear wavy boundary.

A2 – 2 to 10 inches; brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 25 percent gravel; neutral (pH 7.0); clear wavy boundary.

A3 – 10 to 19 inches; brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine, and few medium and coarse roots; many very fine and fine interstitial pores; 25 percent gravel; neutral (pH 7.0); gradual wavy boundary.

A4 – 19 to 23 inches; brown (10YR 4/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine, and few medium and coarse roots; many very fine and fine interstitial pores; 40 percent gravel; neutral (pH 7.0); abrupt wavy boundary.

BE – 23 to 30 inches; brown (10YR 4/3) very gravelly heavy sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine and fine, common medium, and few coarse roots; many very fine and fine interstitial pores; 35 percent gravel and 10 percent cobbles; neutral (pH 7.0); clear wavy boundary.

Bw – 30 to 36 inches; dark yellowish brown (10YR 4/4) very gravelly heavy sandy loam; brown (10YR 4/3) moist; massive, soft, very friable, slightly sticky and slightly plastic; few very fine, fine, medium and coarse roots; many very fine and fine interstitial pores; 40 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bt1 – 36 to 50 inches; yellowish brown (10YR 5/4) very gravelly heavy sandy loam, brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine and fine tubular pores; very few thin clay films bridging mineral sand grains; 40 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bt2 – 50 to 60 inches; yellowish brown (10YR 5/4) gravelly heavy sandy loam, brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine roots; few very fine and fine tubular pores; very few thin clay films bridging mineral sand grains; 30 percent gravel; slightly acid (pH 6.5).

Type Location: About 0.65 mile north on Log Cabin Road, from its intersection with Highway 120, then 3.95 miles on the west fork, and 300 feet west of the road; about 500 feet west and 330 feet south of the apparent center of Section 1, T.1N., R.25E., MDBM, Mono Craters NW Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The Pachic epipedon is 30 to 40 inches thick. The mean annual soil temperature at 20 inches is about 35°F, and the mean summer soil temperature is about 43°F. The textural control section is the whole argillic horizon, or the upper 20 inches of the argillic horizon. It is sandy loam, with 16 to 18 percent clay. Rock fragments are 30 to 50 percent gravel and 0 to 15 percent cobbles, and average 37 to 65 percent by volume.

Some pedons do not have organic surface horizons.

The A horizon has dry color of 10YR 4/3, 5/2 or 5/3; moist color is 10YR 3/2 or 3/3. It is sandy loam, with 2 to 3 percent clay. Rock fragments are 25 to 50 percent gravel and 0 to 15 percent cobbles by volume. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 4/3, 4/4 or 5/4; moist color is 10YR 3/3 or 4/3. It is sandy loam, with 2 to 18 percent clay. Rock fragments are 30 to 50 percent gravel and 0 to 15 percent cobbles by volume. Reaction is slightly acid to neutral.

CHESAW FAMILY

The Chesaw family consists of deep, somewhat excessively drained soils forming in material weathering from granitic, andesitic, rhyolitic and mixed rocks. They are on mountainsides, on slopes of 15 to 80 percent. Elevation is 7,400 to 10,400 feet. The mean annual precipitation is about 10 to 35 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Sandy-skeletal, mixed, frigid Entic Haploxerolls.

Typical Pedon: The representative profile for this soil is on a south by southwest-facing mountainside, under antelope bitterbrush, big sagebrush, Jeffrey pine and grasses, at an elevation of 7,800 feet. Slope is 28 percent. Colors are for dry soil unless otherwise noted.

Oi – 1/2 to 0 inch; decomposing bitterbrush and sagebrush leaves and grass stems; abrupt broken boundary.

A1 – 0 to 2 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, and common medium, coarse and very coarse roots; many very fine and fine interstitial pores; 3 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

A2 – 2 to 13 inches; brown (10YR 5/3) gravelly loamy coarse sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; many very fine and fine interstitial pores; 18 percent gravel and 5 percent cobbles; neutral (pH 7.0); gradual wavy boundary.

C1 – 13 to 32 inches; pale brown (10YR 6/3) gravelly loamy coarse sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 18 percent gravel and 5 percent cobbles; neutral (pH 7.0); clear wavy boundary.

C2 – 32 to 60 inches; light yellowish brown (10YR

6/4) very cobbly loamy sand, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 25 percent gravel, 40 percent cobbles and 15 percent stones; neutral (pH 7.0).

Type Location: About 0.85 mile northwest on Forest Service Road 3S25, from its intersection with Highway 203, then 0.15 mile east on east fork of road, then 0.5 mile north on north fork, on upslope side of road; about 330 feet north of the apparent center of the southwest quarter of Section 30, T.3S., R.28E., MDBM, Mt. Morrison NW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 38°F, and the mean summer soil temperature is about 60°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The 10 to 40 inch textural control section is loamy sand, loamy coarse sand, sand or coarse sand, with 2 to 12 percent clay. Rock fragments are 12 to 50 percent gravel, 0 to 40 percent cobbles, 0 to 60 percent stones and 0 to 40 percent boulders, and average 36 to 87 percent by volume.

Some pedons have A horizons with coarse sand textures. Other pedons do not have an organic surface layer.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2 or 5/3; moist color is 10YR 2/1, 2/2, 3/1, 3/2 or 3/3. It is loamy fine sand, loamy sand or loamy coarse sand, with 3 to 12 percent clay. Rock fragments are 3 to 40 percent gravel, 0 to 27 percent cobbles, 0 to 5 percent stones and 0 to 20 percent boulders by volume. Reaction is strongly acid to neutral.

The C horizon has dry color of 10YR 5/3, 5/4, 6/3 or 6/4; moist color is 10YR 3/2, 3/3, 3/4, 4/3 or 4/4. It is loamy sand, loamy coarse sand, sand or coarse sand, with 2 to 12 percent clay. Rock fragments are 13 to 50 percent gravel, 0 to 40 percent cobbles, 0 to 60 percent stones and 0 to 40 percent boulders by volume. Reaction is strongly acid to neutral.

CORBETT FAMILY

The Corbett family consists of deep, somewhat excessively drained soils forming in material weathering from rhyolitic, andesitic and granitic rocks. These soils are on mountainsides and hillsides, and have slopes of 3 to 70 percent. Elevation is 7,100 to 10,200 feet. The mean annual precipitation is about 10 to 35 inches, and the mean annual temperature is about 42 °F.

Taxonomic Class: Mixed, frigid Typic Xeropsamments.

Typical Pedon: The representative profile for this soil is on a northwest-facing mountainside, under Jeffrey pine, red fir, big sagebrush, and bitterbrush, at an elevation of 7,680 feet. Slope is 31 percent. When described (8/16/84), the soil was dry in the 3 to 16 inch section, and slightly moist in the rest of the profile. Colors are for dry soil unless otherwise noted.

- A1 – 0 to 3 inches; light brownish gray (10YR 6/2) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 20 percent gravel; moderately acid (pH 6.0); clear wavy boundary.
- C1 – 3 to 16 inches; light gray (10YR 7/2) gravelly loamy sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and common fine roots; many very fine and fine interstitial pores; 25 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.
- C2 – 16 to 36 inches; light gray (10YR 7/1) gravelly loamy sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine and fine interstitial pores; 25 percent gravel; slightly acid (pH 6.5); clear wavy boundary.
- C3 – 36 to 46 inches; white (10YR 8/1) gravelly loamy sand, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine, medium, coarse and very coarse roots; many very fine and fine interstitial pores; 25 percent gravel; slightly acid (pH 6.5); clear wavy boundary.
- C4 – 46 to 52 inches; white (N 8/0) extremely gravelly loamy sand, light brownish gray (10YR 6/2) moist; massive; soft, very friable, nonsticky and nonplastic;

few fine and medium roots; common very fine and fine, and many medium interstitial pores; 75 percent gravel; slightly acid (pH 6.5); abrupt wavy boundary.

Cr – 52 inches; rhyolitic tuff, which can be cut with a tilespade.

Type Location: About 2.25 miles southwest on Forest Service Road 3S08, from its intersection with Forest Service Road 2S07, then 1.15 miles north on intersecting road, on the south shoulder of the road; about 330 feet west and 165 feet south of the northeast quarter of the northwest quarter of Section 31, T.2S., R.28E., MDBM, Mount Morrison Quadrangle.

Range in Characteristics: Soil depth to the paralithic or lithic contact is 52 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 44°F, and the mean summer soil temperature is about 61°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The soil moisture control section is 13 to 60 inches. It is usually dry in all parts from mid-June to late September, and moist in some or all parts the rest of the year. The 10 to 40 inch textural control section is loamy fine sand, loamy sand, loamy coarse sand, sand or coarse sand, with 1 to 5 percent clay. Rock fragments, are 1 to 30 percent gravel, 0 to 5 percent cobbles and 0 to 5 percent stones, and average 7 to 34 percent by volume.

Some pedons are weakly cemented with silica at depths of 33 to 40 inches. Some pedons have O horizons up to one inch thick. Other pedons have surface horizons with coarse sand textures.

The A horizon has dry color of 10YR 4/2, 5/1, 5/2 or 6/2; moist color is 10YR 3/2, 4/1 or 4/2. It is loamy fine sand, loamy sand or loamy coarse sand, with 1 to 5 percent clay. Rock fragments are 1 to 30 percent gravel by volume. Reaction is moderately to slightly acid.

The C horizon has dry color of 10YR 5/3, 6/2, 6/3, 7/1, 7/2, 7/3 or 8/1, or N8/0, or 2.5Y 6/1 or 7/1; moist color is 10YR 3/2, 3/3, 4/2, 4/3, 5/1, 5/2, 5/3 or 6/2, or 2.5Y 4/1 or 5/1. It is loamy fine sand, loamy sand, loamy coarse sand, sand, or coarse sand, with 1 to 5 percent clay. Rock fragments are 0 to 75 percent gravel, 0 to 15 percent cobbles, and 0 to 15 percent stones by volume. Reaction is moderately acid to neutral.

COWOOD FAMILY

The Cowood family consists of shallow, well drained soils forming from granitic and metasedimentary rocks. These soils are on mountainsides, mountain benches and ridges, and have slopes of 2 to 60 percent. Elevation is 7,400 to 11,000 feet. The mean annual precipitation is about 10 to 25 inches, and the mean annual temperature is about 41 °F.

Taxonomic Class: Loamy-skeletal, mixed Lithic Cryochrepts.

Typical Pedon: The representative profile for this soil is on an east-facing mountain ridge, under mountain mahogany and sagebrush, at an elevation of 10,693 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; dark grayish brown (10YR 4/2) extremely stony loamy coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, non-sticky and nonplastic; common very fine and few fine roots; many very fine interstitial pores; 35 percent gravel, 15 percent cobbles, 30 percent stones and 15 percent boulders; slightly acid (pH 6.4); clear smooth boundary.

A2 – 2 to 5 inches; dark grayish brown (10YR 4/2) extremely stony sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse subangular blocky structure, parting to weak very fine and fine subangular blocky; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine and common fine tubular pores; 35 percent gravel, 15 percent cobbles, 30 percent stones and 15 percent boulders; slightly acid (pH 6.3); clear smooth boundary.

Bw – 5 to 11 inches; yellowish brown (10YR 5/4) extremely stony sandy loam, brown (10YR 4/3) moist; moderate medium and coarse subangular

blocky structure, parting to moderate fine subangular blocky; soft, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; few very fine tubular pores; 5 percent gravel, 15 percent cobbles, 30 percent stones and 15 percent boulders; slightly acid (pH 6.3); abrupt smooth boundary.

R – 11 inches; hard adamellite bedrock.

Type Location: About 165 feet south of the apparent center of the southeast quarter of Section 1, T.9S., R.32E., MDBM, Big Pine NW Quadrangle.

Range in Characteristics: The soil depth to bedrock is less than 20 inches. The mean annual soil temperature at the lithic contact is 41°F, and the mean summer soil temperature is 53°F. The textural control section is either the whole soil for pedons 14 inches or less deep to bedrock, or the 10 inch to lithic contact section for soils deeper than 14 inches to bedrock. It is loam, sandy loam or loamy coarse sand, with 1 to 15 percent clay. Rock fragments are 5 to 60 percent gravel, 10 to 15 percent cobbles, 0 to 30 percent stones and 0 to 15 percent boulders, and average 70 to 79 percent by volume.

The A horizon has dry color of 10YR 4/2 or 5/2; moist color is 10YR 3/2. It is sandy loam or loamy coarse sand, with 2 to 8 percent clay. Rock fragments are 35 percent gravel, 5 to 15 percent cobbles, 0 to 30 percent stones and 0 to 15 percent boulders by volume. Reaction is slightly acid.

The Bw horizon has dry color of 10YR 5/4 or 5/6; moist color is 10YR 4/3 or 4/4. It is loam or sandy loam, with 10 to 15 percent clay. Rock fragments are 5 to 60 percent gravel, 10 to 15 percent cobbles, 0 to 30 percent stones and 0 to 15 percent boulders by volume. Reaction is slightly acid to neutral.

COZETICA FAMILY

The Cozetica family consists of deep, somewhat excessively drained soils forming from ash and pumice. These soils are on mountainsides, moraines, mountain flats, mountain toeslopes, and on edges of mountain basins, and have slopes of 0 to 60 percent. Elevation is 7,200 to 9,200 feet. The mean annual precipitation is about 10 to 25 inches, and the mean annual soil temperature is about 44°F.

Taxonomic Class: Ashy, frigid Vitrandic Torripsamments.

Typical Pedon: The reference profile for this soil is on a west by southwest-facing mountainside, under big sagebrush and antelope bitterbrush, at an elevation of 7,040 feet. Slope is 43 percent. When described (5/8/85), the soil was slightly moist from the 2 to 19 inch depth and the 24 to 60 inch depth, and dry in the remainder of the profile. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; grayish brown (10YR 5/2) gravelly sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 28 percent pumice and obsidian gravel; strongly acid (pH 5.5); clear wavy boundary.

A2 – 2 to 6 inches; light brownish gray (10YR 6/2) gravelly sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 15 percent pumice and obsidian gravel; slightly acid (pH 6.2); clear wavy boundary.

C1 – 6 to 16 inches; light brownish gray (10YR 6/2) loamy sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine and medium roots; 8 percent pumice and obsidian gravel; slightly acid (pH 6.1); abrupt wavy boundary.

2A – 16 to 24 inches; light gray (10YR 7/2) gravelly coarse sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 15 percent pumice and obsidian gravel; moderately acid (pH 5.7); clear wavy boundary.

2C2 – 24 to 36 inches; very pale brown (10YR 7/3) grav-

elly coarse sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 28 percent pumice and obsidian gravel; moderately acid (pH 5.7); gradual wavy boundary.

3C3 – 36 to 42 inches; very pale brown (10YR 7/3) gravelly coarse sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 15 percent pumice and obsidian gravel; strongly acid (pH 5.4)

4C4 – 42 to 60 inches; light gray (10YR 7/2) gravelly coarse sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 34 percent pumice and obsidian gravel; strongly acid (pH 5.5).

Type Location: About 1.15 miles south on road at the intersection of Highway 120 and Panum Crater Road, then 0.1 mile east on mining road, on east shoulder of road; about 0.2 mile south of the apparent center of Section 31, T.1N., R.27E., MDBM, Mono Craters NE Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The mean annual soil temperature is about 44°F, and the mean summer soil temperature is about 61°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The 10 to 40 inch textural control section is loamy sand, loamy coarse sand or coarse sand, with 0 to 2 percent clay. Rock fragments are 3 to 30 percent pumice and obsidian gravel, dominated by pumice, and average 17 to 29 percent by volume.

The surface A horizon has dry color of 10YR 5/2, 6/2 or 7/2; moist color is 10YR 3/2 or 4/2. It is sand or coarse sand, with 0 to 1 percent clay. Rock fragments are 2 to 30 percent pumice and obsidian gravel, and average 17 to 29 percent by volume. Reaction is strongly to slightly acid.

The other A horizons have dry color of 10YR 5/2, 6/2, 6/3, 6/4, 7/1 or 7/2; moist color is 10YR 3/2, 3/3, 4/2, 4/3, 4/4 or 5/2. They are loamy coarse sand, sand or coarse sand, with 0 to 1 percent clay. Rock fragments are

3 to 25 percent pumice and obsidian gravel by volume. Reaction is moderately acid to neutral.

The C horizons have dry color of 10YR 5/3, 6/2, 6/3, 7/2 or 7/3; moist color is 10YR 3/3, 4/3, 5/2 or 5/3.

They are loamy sand, loamy coarse sand or coarse sand, with 0 to 2 percent clay. Rock fragments are 8 to 34 percent pumice and obsidian gravel by volume. Reaction is strongly acid to neutral.

CREDO FAMILY

The Credo family consists of moderately deep to very deep, well drained soils forming in material weathering from granitic and mixed rocks. These soils are on mountainsides and hillsides, and have slopes of 15 to 60 percent. Elevation is 7,500 to 8,800 feet. The mean annual precipitation is about 12 to 20 inches, and the mean annual temperature is about 45°F.

Taxonomic Class: Fine-loamy, frigid Xeric Haplargids

Typical Pedon: The representative profile for this soil is on a north-facing hillside, under big sagebrush, bitterbrush, Indian ricegrass, squirreltail and bunchgrasses, at an elevation of 7,600 feet. Slope is 45 percent. Colors are for dry soil unless otherwise noted.

Oi – 1 to 0 inches; decomposed and decomposing big sagebrush and bitterbrush leaves and twigs; abrupt wavy boundary.

A – 0 to 5 inches; grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; weak medium grading to weak very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine and fine interstitial and tubular pores; 15 percent gravel, 10 percent cobbles and 2 percent stones; neutral (pH 6.6); clear wavy boundary.

Bt1 – 5 to 13 inches; brown (10YR 5/3) gravelly loam, dark grayish brown (2.5Y 4/2) moist; moderate fine grading to moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, common fine and few medium and coarse roots; common very fine and few fine tubular pores; few thin clay films line tubular pores; 20 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

Bt2 – 13 to 23 inches; light olive brown (2.5Y 5/4) loam, olive brown (2.5Y 4/4) moist; moderate medium, coarse grading to moderate fine subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few fine and medium roots; common very fine and fine, and few medium tubular pores; common moderately thick clay films line tubular pores; 5 percent gravel and 5 percent cobbles;

slightly acid (pH 6.4); gradual wavy boundary.

Bt3 – 23 to 29 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; weak medium and coarse grading to weak very fine and fine subangular blocky structure; hard, firm, sticky and plastic; few fine roots; few very fine tubular pores; few thin clay films line tubular pores; 5 percent gravel; slightly acid (pH 6.4); abrupt wavy boundary.

Cr – 29 to 57 inches; highly weathered granite & metasedimentary rock; light yellowish brown (2.5Y 6/4), olive brown (2.5Y 4/4) moist; massive; hard, firm, slightly sticky and slightly plastic; 15 percent cobbles; slightly acid (pH 6.4).

Type Location: About 500 feet east of the northwest corner of the northwest quarter of the northeast quarter of Section 6, T.3S., R.31E., MDBM, Casa Diablo Mtn NE Quadrangle. Roadcut on Wildrose grade.

Range in Characteristics: Soil depth ranges from 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 48°F. The mean summer soil temperature is about 68°F. The 10 to 40 inch textural control section is fine-loamy, and is loam or clay loam, with 25 to 30 percent clay. Rock fragments are 0 to 20 percent gravel, 0 to 20 percent cobbles and 0 to 5 percent stones, and average 40 to 85 percent by volume.

Some pedons are 20 to 40 inches deep to lithic or paralithic contact.

The A horizon has dry color of 10YR 4/3, 5/2, 5/3, 5/4, 6/2 or 6/3; moist color is 10YR 3/2, 3/3, 4/2, 4/3 or 4/4. It is sandy loam or loam, with 6 to 15 percent clay. Rock fragments are 0 to 20 percent gravel, 0 to 15 percent cobbles and 0 to 5 percent stones. Reaction is slightly acid to neutral.

The Bt horizon has dry color of 10YR 5/3, 5/4, 6/2, 6/3, 2.5Y 4/4, 5/4 or 6/4; moist color is 2.5Y 4/2, 4/4 or 5/4. It is loam or clay loam, with 20 to 32 percent clay. Rock fragments are 0 to 10 percent gravel, 0 to 20 percent cobbles and 0 to 3 percent stones. Reaction is slightly acid to neutral.

CUMULIC HAPLOXEROLLS

These Cumulic Haploxerolls consist of deep, somewhat poorly drained soils forming in drainage bottoms from alluvium weathered from mixed rocks, and have slopes of 0 to 9 percent. Elevation is 6,300 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Cumulic Haploxerolls

Typical Pedon: The representative profile for this soil is on a southeast-facing relict shoreline, under grasses and sedges, at an elevation of 6,450 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 4 inches; gray (10YR 5/1 and 6/1) loam, very dark grayish brown (10YR 3/2) moist; massive to weak very fine granular structure; hard, friable, slightly sticky and slightly plastic; common very fine, fine and medium roots; common very fine vesicular and tubular and few medium tubular pores; noneffervescent; neutral (pH 7.1); abrupt wavy boundary.

C1 – 4 to 16 inches; gray (10YR 6/1 and 5/1) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic to moderate fine and medium platy structure; hard, friable, slightly sticky and plastic; common very fine and fine roots; many very fine tubular and common medium and coarse tubular pores; noneffervescent; neutral (pH 7.2); clear wavy boundary.

C2 – 16 to 29 inches; gray (10YR 6/1) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; few very fine, fine and medium roots; common very fine and few medium and coarse tubular pores; noneffervescent; neutral (pH 7.2) clear wavy boundary.

C3 – 29 to 43 inches; gray (10YR 6/1 and 5/1) silty clay loam, very dark grayish brown (10YR 3/2) moist; with few fine distinct yellowish brown (10YR 5/4) iron stains on faces of peds, yellowish brown (10YR 5/6) moist; moderate fine and medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots; many very fine and fine and

common medium and coarse tubular pores; noneffervescent; neutral (pH 7.2); clear wavy boundary.

C4 – 43 to 56 inches; gray (10YR 6/1 and 5/1) clay loam, very dark grayish brown (10YR 3/2) moist; with faint yellowish brown (10YR 5/4) iron stains on faces of peds, yellowish brown (10YR 5/6) moist; moderate medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; very few very fine roots; common very fine, fine and few medium and coarse tubular pores; noneffervescent; neutral (pH 7.2); clear wavy boundary.

C5 – 56 to 60 inches; gray (10YR 6/1) clay loam, very dark grayish brown (10YR 3/2), with common iron stains on faces of peds, light olive brown (2.5Y 5/4) moist; massive to weak medium subangular blocky structure; hard, friable, sticky and plastic; no roots; 10 percent very fine gravel; noneffervescent; neutral (pH 7.2); clear wavy boundary.

Type Location: About 0.5 miles east of Dechambeau Ranch, 1,500 feet east from shoulder of dirt road; at 2.1 miles south of the southeast corner of Sec. 27, T.2N., R.26E., MDBM, Bodie SE Quadrangle.

Range in Characteristics: Soil depth is usually greater than 60 inches. The mean annual soil temperature at 20 inches is about 45°F. The mean annual summer and winter soil temperatures differ by more than 9°F. The textural control section is 10 to 40 inches, and is fine-loamy, with 18 to 35 percent clay. Rock fragments are gravel, and range from 0 to 15 percent, and average 0 to 18 percent by volume.

The A horizon has dry color of 10YR 6/1, 6/2, 5/1 or 5/2; moist color is 10YR 3/2 or 3/1. Textures is loam, with 12 to 20 percent clay. Gravel-size rock fragments average 0 to 2 percent by volume.

The C horizon has dry color of 10YR 6/1, 6/2, 6/3, 5/1, 5/2 or 5/3; moist color is 10YR 5/1, 5/2, 5/3, 4/1, 4/2, 4/3, 3/1, 3/2 or 3/3. Textures are silty clay loam, sandy clay loam or clay loam, with 18 to 35 percent clay. Gravel-size rock fragments average 0 to 15 percent by volume.

DECHAMBEAU FAMILY

The Dechambeau family consists of very deep, well drained soils forming from mixed alluvium influenced by volcanic ash. These soils are on alluvial fans and lakeshore terraces, and have slopes of 1 to 15 percent. Elevation is 6,400 to 7,300 feet. The mean annual precipitation is about 6 to 12 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Coarse-loamy, mixed (nonacid), mesic Xeric Torriorthents

Typical Pedon: The representative profile for this soil is on a south-by-southwest-facing lakeshore terrace, under big sagebrush and rabbitbrush, at an elevation of 6,800 feet. Slope is 6 percent. When described (9/27/74), the soil was dry throughout. Colors are for dry soil unless otherwise noted.

- A1 – 0 to 3 inches; light brownish gray (10YR 6/2) gravelly sandy loam, dark brown (10YR 3/3) moist; weak thick platy structure; soft; very friable, nonsticky and nonplastic; common fine and very fine roots; common very fine tubular and fine interstitial pores; 20 percent angular gravel; slightly acid (pH 6.4); abrupt smooth boundary.
- A2 – 3 to 7 inches; light brownish gray (10YR 6/2) gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure, parting to massive; soft, very friable, nonsticky and nonplastic; many very fine and fine, and common medium and coarse roots; common very fine tubular and fine interstitial pores; 20 percent angular gravel; neutral (pH 6.6); clear wavy boundary.
- C1 – 7 to 17 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine, and common medium and coarse roots; few very fine and fine tubular and interstitial pores; 20 percent angular gravel; neutral (pH 6.6); clear wavy boundary.
- C2 – 17 to 25 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; massive; slightly hard, very friable,

nonsticky and nonplastic; common very fine and fine, and few medium and coarse roots; common very fine and fine interstitial, and common very fine, fine, medium and coarse tubular pores; 20 percent angular gravel; neutral (pH 6.6); clear wavy boundary.

C3 – 25 to 60 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine, and few medium and coarse roots; common fine interstitial, and common very fine, fine, and few medium and coarse tubular pores; 25 percent angular gravel; neutral (pH 6.6)

Type Location: In the Bodie-Coleville Soil Survey Area, about 0.75 mile north of Poleline Road and 50 feet northeast of the unimproved dirt road to Conway Ranch; about 350 feet west and 1,000 feet south of the northeast corner of Section 5, T.2N., R.26E., MDBM, Bodie Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer and mean winter soil temperatures differ by more than 9°F. The 10 to 40 inch textural control section is gravelly sandy loam, with 3 to 15 percent clay. Rock fragments are 15 to 35 percent gravel and 0 to 15 percent stones, and average 15 to 25 percent by volume. Reaction is slightly acid to neutral throughout.

The A horizon has dry color of 10YR 5/2, 5/3, 6/2, 6/3, 7/2 or 7/3; moist color is 10YR 3/2, 3/3, 4/2 or 4/3. It is gravelly sandy loam, very gravelly sandy loam, sandy loam or loamy sand. Rock fragments are 0 to 35 percent gravel and 0 to 10 percent cobbles, and average 0 to 50 percent by volume.

The C horizon has dry color of 10YR 5/3, 5/4, 6/3 or 6/4; moist color is 7.5YR 4/4, 2.5Y 4/4, 10YR 3/3, 3/4, 4/3 or 4/4. It is gravelly sandy loam or gravelly fine sandy loam. Strata of loamy sand are present in some pedons. Rock fragments are 15 to 35 percent gravel and 0 to 15 percent cobbles by volume.

DEEPWELL FAMILY

The Deepwell family consists of very deep, somewhat excessively drained soils forming from windblown rhyolitic volcanic ash. These soils are on sand dunes on basin floors and lake terraces, and have slopes of 2 to 30 percent. Elevation is 6,300 to 6,800 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Ashy, mesic calcareous Vitrandic Torripsamments

Typical Pedon: The representative profile for this soil is on a southwest-facing lake terrace, under rubber rabbitbrush, hairy horsebrush, fourwing saltbush and black greasewood, at an elevation of 6,500 feet. Slope is 10 percent. Colors are for dry soil unless otherwise noted.

C1 – 0 to 3 inches; light gray (10YR 7/1) sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; slightly alkaline (pH 7.6); clear smooth boundary.

C2 – 3 to 60 inches; light gray (10YR 7/1) sand, grayish brown (10YR 5/2) moist; single grain; loose, non-

sticky and nonplastic; common very fine, and few fine and medium roots; many very fine interstitial pores; slightly alkaline (pH 7.6).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 7 miles northwest of Benton, California, in Adobe Valley, and 1 mile northwest of Antelope Mountain; about 1,100 feet east and 2,800 feet north of the southwest corner of Section 33, T.1N., R.31E., MDBM, Glass Mountain Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 62°F. The difference between the mean annual summer and mean winter soil temperature is greater than 9°F. The 10 to 40 inch textural control section is sand, with 0 to 3 percent clay. Rock fragments are pumice gravel, and are 0 to 10 percent by volume. The ash content ranges from 60 to 100 percent by weight.

The C horizon has dry color of 10YR 6/2, 7/1 or 7/3; moist color is 10YR 4/2, 5/2 or 5/3. It is sand or fine sand. Rock fragments are pumice gravel, and are 0 to 10 percent by volume. Base saturation is 90 to 100 percent. Reaction is neutral to moderately alkaline.

DELANEY FAMILY

The Delaney family consists of moderately deep to deep, somewhat excessively drained soils forming in material weathering from pumice and tuff. These soils are on mountainsides and alluvial fans, on slopes of 0 to 60 percent. Elevation is 5,800 to 8,800 feet. The mean annual precipitation is about 6 to 18 inches, and the mean annual temperature is about 46°F.

Taxonomic Class: Ashy, mesic Vitrandic Xeropsamments.

Typical Pedon: The representative profile for this soil is on a northwest-facing mesa, under big sagebrush, rabbitbrush, antelope bitterbrush, Jeffrey pine and pinyon pine, at an elevation of 7,500 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 3 inches; light brownish gray (10YR 6/2) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many medium interstitial pores; 15 percent pumice gravel; slightly acid (pH 6.4); clear wavy boundary.

A2 – 3 to 10 inches; light brownish gray (10YR 6/2) loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure, parting to weak fine granular; soft, very friable, nonsticky and nonplastic; many very fine, and common medium interstitial pores; slightly acid (pH 6.4); abrupt smooth boundary.

2C1 – 10 to 15 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; few fine and medium interstitial pores; 10 percent pumice gravel; slightly acid (pH 6.4); clear smooth boundary.

2C2 – 15 to 23 inches; brown (10YR 5/3) gravelly loamy sand, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; few fine and

medium interstitial pores; 30 percent pumice gravel; slightly acid (pH 6.5); abrupt smooth boundary.

R – 23 inches; hard rhyolitic bedrock.

Type Location: About 0.3 mile west and 0.05 mile north of the southeast corner of Section 10, T.4S., R.30E., MDBM, Casa Diablo Quadangle.

Range in Characteristics: Soil depth to the lithic or paralithic contact is 23 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The soil moisture control section is 12 to 35 inches. It is usually dry from mid-April to late November, and is usually moist in some part the rest of the year. The textural control section is from 10 inches to the lithic or paralithic contact in pedons shallower than 40 inches, and is the 10 to 40 inch section in pedons deeper than 40 inches. It is loamy fine sand, loamy sand or coarse sand, with 0 to 5 percent clay. Rock fragments are 0 to 30 percent pumice gravel and 0 to 5 percent tuff cobbles, and average 16 to 29 percent by volume.

The surface A horizon has dry color of 10YR 5/2, 6/2 or 6/3; moist color is 10YR 3/2, 4/2 or 4/4. It is loamy sand, loamy coarse sand or sand, with 0 to 4 percent clay. Rock fragments are 10 to 45 percent pumice gravel by volume. Reaction is slightly acid.

The other A horizons have dry color of 10YR 5/2, 5/3, 6/2, 6/3 or 7/2; moist color is 10YR 3/2, 3/3, 4/2, 5/2, 5/3 or 6/3. They are loamy fine sand, loamy sand, loamy coarse sand or coarse sand, with 0 to 4 percent clay. Rock fragments are 0 to 20 percent pumice gravel by volume. Reaction is moderately to slightly acid.

The C horizon has dry color of 10YR 5/3, 6/3, 7/1 or 7/3; moist color is 10YR 3/3, 4/3, 4/4, 5/2, 5/3, 5/4 or 6/2. They are loamy fine sand, loamy sand or coarse sand, with 0 to 5 percent clay. Rock fragments are 0 to 30 percent pumice gravel and 0 to 5 percent rhyolite or tuff cobbles by volume. Reaction is moderately acid to neutral.

FEZ FAMILY

The Fez family consists of moderately deep to very deep, somewhat excessively drained soils forming in material weathering from pumice. They are on mountainsides, hillsides and upland drainages and depressions, and have slopes of 0 to 60 percent. Elevation is 8,000 to 9,800 feet. The mean annual precipitation is about 15 to 25 inches, and the mean annual temperature is about 39°F.

Taxonomic Classification: Ashy, frigid Vitrandic Haploxerolls.

Typical Pedon: The representative profile for this soil is on a north by northeast-facing hillside, under quaking aspen, at an elevation of 8,760 feet. Slope is 32 percent. When described (8/27/86), the soil was dry in the upper 34 inches and moist in the rest of the profile. Colors are for dry soil unless otherwise noted.

Oe – 1 to 0 inch; decomposing aspen leaves and twigs; abrupt smooth boundary.

A1 – 0 to 4 inches; grayish brown (10YR 5/2) sand, very dark gray (10YR 3/1) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine, and common medium roots; many very fine and fine interstitial pores; 3 percent pumice and granitic gravel; moderately acid (pH 6.0); gradual wavy boundary.

A2 – 4 to 10 inches; brown (10YR 5/3) sand, very dark gray (10YR 3/1) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium and coarse roots; many very fine and fine interstitial pores; 8 percent pumice and granitic gravel; moderately acid (pH 6.0); clear wavy boundary.

C1 – 10 to 34 inches; brown (10YR 5/3) sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, and few fine, medium and coarse roots; many very fine and fine interstitial pores; 5 percent pumice and granitic gravel; moderately acid (pH 6.0); gradual smooth boundary.

C2 – 34 to 47 inches; variegated brown and light yellowish brown (10YR 5/3 and 10YR 6/4) sand, very dark grayish brown and yellowish brown (10YR 3/2 and 10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, and common fine, medium and coarse roots; many very fine

and fine interstitial pores; 13 percent pumice and granitic gravel; moderately acid (pH 6.0); gradual smooth boundary.

C3 – 47 to 60 inches; variegated yellowish brown and light yellowish brown (10YR 5/4 and 10YR 6/4) gravelly sand, dark yellowish brown and yellowish brown (10YR 4/2 and 10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine and fine interstitial pores; 15 percent pumice and granitic gravel; moderately acid (pH 6.0).

Type Location: About 550 feet east and 880 feet north of the apparent center of Section 30, T.1S., R.29E., MDBM, Cowtrack Mountain SE Quadrangle.

Range in Characteristics: Soil depth to hard bedrock is 24 to greater than 60 inches. The mean annual soil temperature at 20 inches is 37°F, and the mean summer soil temperature is 53°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The textural control section is from 10 inches to bedrock in pedons shallower than 40 inches, and is the 10 to 40 inch section in pedons deeper than 40 inches. It is loamy fine sand, loamy sand, loamy coarse sand, sand or coarse sand, with 2 to 5 percent clay. Rock fragments are 0 to 30 percent gravel, 0 to 15 percent cobbles and 0 to 5 percent stones, and average 5 to 21 percent by volume. The gravel is mostly pumice, with minor amounts of granitic, obsidian or mixed rock. The cobbles and stones are basalt rock.

Some pedons have surface mineral horizons with loamy very fine sand or coarse sand textures. Other pedons do not have an organic surface layer. A few pedons have duripans at soil depths greater than 40 inches.

The surface A horizon has dry color of 10YR 4/2, 5/1, 5/2 or 5/3; moist color is 10YR 3/1 or 3/2. It is loamy sand or sand, with 2 to 7 percent clay. Rock fragments are 3 to 30 percent gravel by volume, and are mostly pumice, with minor amounts of obsidian, granitic and mixed rocks. Reaction is strongly to slightly acid.

The other A horizons have dry color of 10YR 5/2, 5/3, 5/4 or 6/3; moist color is 10YR 3/1, 3/2, 3/3, 4/2 or 4/4. They are loamy fine sand, loamy sand, loamy coarse sand, sand or coarse sand, with 1 to 3 percent clay. Rock fragments are 0 to 30 percent gravel by volume, and are mostly pumice, with minor amounts of obsidian,

granitic and mixed rocks. Reaction is moderately acid to moderately alkaline.

The C horizon has dry color of 10YR 5/3, 5/4, 6/3 or 6/4; moist color is 10YR 3/2, 3/3, 4/2, 4/4 or 5/4. It is loamy fine sand, loamy sand, sand or coarse sand, with 2 to 5 percent clay. Rock fragments are 0 to 25

percent gravel, 0 to 15 percent cobbles and 0 to 5 percent stones by volume. The gravel is mostly pumice, with minor amounts of obsidian, granitic and mixed rocks. The cobbles and stones are mostly basalt, with minor amounts of obsidian and granitic rock.

GARLET FAMILY

The Garlet family consists of moderately deep to deep, well drained soils forming from mixed rocks. These soils are on moraines, mountainsides, hillsides and stream channels, and have slopes of 2 to 60 percent. Elevation is 7,600 to 11,300 feet. The mean annual precipitation is about 14 to 25 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Loamy-skeletal, mixed Typic Cryochrepts.

Typical Pedon: The representative profile for this soil is on a west-facing moraine, under rabbitbrush and phlox, at an elevation of 9,800 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 3 inches; brown (10YR 5/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots, many very fine interstitial pores; 15 percent gravel, 5 percent cobbles and 2 percent stones; neutral (pH 6.7); clear wavy boundary.

A2 – 3 to 6 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine and few fine interstitial pores; 20 percent gravel; neutral (pH 6.8); clear wavy boundary.

Bw – 6 to 14 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium and coarse subangular blocky structure, parting to weak very fine and fine subangular blocky; slightly hard, friable, slightly sticky and nonplastic; many very fine and common fine roots; few very fine interstitial pores; 35 percent gravel; neutral (pH 6.9); clear smooth boundary.

C1 – 14 to 24 inches; yellowish brown (10YR 5/4) very gravelly coarse sandy loam, dark yellowish

brown (10YR 4/4) moist; massive; soft, very friable, slightly sticky and nonplastic; common very fine and few fine roots; many very fine interstitial pores; 45 percent gravel; neutral (pH 6.8).

R – 24 inches; hard granite bedrock.

Type Location: About 165 feet west and 350 feet north of the southeast corner of the northeast quarter of the southwest quarter of Section 2, T.9S., R.32E., MDBM, Big Pine NW Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 20 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 41°F, and the mean summer soil temperature is about 53°F. The textural control section is from 10 inches to the lithic contact for pedons less than 40 inches deep, and is the 10 to 40 inch section for pedons deeper than 40 inches. It is loam, sandy loam or coarse sandy loam, with 6 to 14 percent clay. Rock fragments are 35 to 55 percent gravel and 0 to 15 percent cobbles, and average 42 to 58 percent by volume.

Some pedons do not have C horizons.

The A horizon has dry color of 10YR 4/3 or 5/3; moist color is 10YR 2/2, 3/2 or 3/3. It is loam, sandy loam or loamy sand, with 3 to 12 percent clay. Rock fragments are 15 to 20 percent gravel, 0 to 5 percent cobbles and 0 to 2 percent stones by volume. Reaction is neutral.

The Bw horizon has dry color of 10YR 5/4 or 6/4; moist color is 10YR 3/4, 4/3 or 4/4. It is loam or sandy loam, with 6 to 14 percent clay. Rock fragments are 35 to 55 percent gravel and 0 to 15 percent cobbles by volume. Reaction is slightly acid to neutral.

The C horizon has dry color of 10YR 5/4 or 7/6; moist color is 10YR 4/4 or 4/6. It is loam or coarse sandy loam, with 8 to 12 percent clay. Rock fragments are 40 to 50 percent gravel and 0 to 10 percent cobbles by volume. Reaction is moderately acid to neutral.

GLEAN FAMILY

The Glean family consists of very deep, well drained soils forming in material weathering from basalt and granodiorite rock. These soils are on moraines, moraine ridges and mountainsides, and have slopes of 0 to 60 percent. Elevation is 7,600 to 10,200 feet. The mean annual precipitation is about 10 to 30 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Loamy-skeletal, mixed, frigid Pachic Haploxerolls

Typical Pedon: The representative profile for this soil is on a west-facing hillside, under big sagebrush and antelope bitterbrush, at an elevation of 9,600 feet. Colors are for dry soil unless otherwise noted.

A – 0 to 1 inch; dark grayish brown (10YR 4/2) extremely stony loam sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; many very fine roots; many medium interstitial pores; 15 percent gravel, 25 percent cobbles and 25 percent stones; slightly acid (pH 6.4); clear smooth boundary.

Bw1 – 1 to 6 inches; brown (10YR 4/3) very stony sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many medium interstitial pores; 10 percent gravel, 5 percent cobbles and 25 percent stones; neutral (pH 6.7); gradual wavy boundary.

Bw2 – 6 to 15 inches; brown (10YR 4/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine, common fine and few medium roots; many medium interstitial pores; 10 percent gravel, 40 percent cobbles and 1 percent stones; neutral (pH 6.8); gradual wavy boundary.

C1 – 15 to 29 inches; brown (10YR 5/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine, and few fine and medium roots; many medium interstitial pores; 10 percent gravel and 30 percent cobbles; neutral (pH 6.9); gradual wavy boundary.

2C2 – 29 to 60 inches; brown (10YR 5/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; many medium interstitial pores; 25 percent gravel and 20 percent cobbles; neutral (pH 6.7).

Type Location: About 0.35 miles south and 0.25 miles east of the northwest quarter of Section 34, T.2S., R.30E., MDBM, Casa Diablo NW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The pachic epipedon is 30 to 38 inches thick. The mean annual soil temperature at 20 inches is about 38°F, and the mean summer temperature is about 60°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The textural control section is the 10 to 40 inch section. It is sandy loam or coarse sandy loam, with 3 to 12 percent clay. Rock fragments are 7 to 56 percent gravel, 0 to 40 percent cobbles, 0 to 25 percent stones and 0 to 25 percent boulders, and average 43 to 80 percent by volume.

Some pedons have organic surface horizons.

The A horizon has dry color of 10YR 4/2, 5/2 or 5/3; moist color is 10YR 2/2, 3/1, 3/2 or 3/3. It is sandy loam or loamy sand, with 2 to 12 percent clay. Rock fragments are 13 to 42 percent gravel, 0 to 32 percent cobbles and 0 to 25 percent stones by volume. Reaction is slightly acid to neutral.

The Bw horizon has dry color of 10YR 4/3, 5/3, 5/4 or 6/3; moist color is 10YR 3/2, 3/3 or 3/4. It is sandy loam, with 6 to 12 percent clay. Rock fragments are 7 to 56 percent gravel, 5 to 40 percent cobbles and 0 to 25 percent stones by volume. Reaction is neutral.

The C horizon has dry color of 10YR 5/3 or 6/4; moist color is 10YR 3/3 or 4/3. It is sandy loam or coarse sandy loam, with 3 to 10 percent clay. Rock fragments are 10 to 38 percent gravel, 20 to 34 percent cobbles and 0 to 25 percent boulders by volume. Reaction is slightly acid to neutral.

GOODALE FAMILY

The Goodale family consists of very deep, somewhat excessively drained soils forming in granitic alluvium. These soils are on bouldery alluvial fans and fan terraces, and have slopes of 5 to 15 percent. Elevation is 3,900 to 6,800 feet. The mean annual precipitation is about 4 to 10 inches, and the mean annual temperature is about 57°F.

Taxonomic Class: Sandy-skeletal, mixed, thermic Xeric Torriorthents

Typical Pedon: The representative profile for this soil is on an east-facing fan terrace, under blackbrush, Nevada ephedra and desert needlegrass, at an elevation of 4,200 feet. Slope is 11 percent. Colors are for dry soil unless otherwise noted.

- A1 – 0 to 1 inch; brown (10YR 5/3) bouldery loamy coarse sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; 15 percent gravel, 5 percent cobbles, 5 percent stones and 5 percent boulders; neutral (pH 6.8); abrupt smooth boundary.
- A2 – 1 to 12 inches; pale brown (10YR 6/3) bouldery loamy coarse sand, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; many very fine interstitial pores; 15 percent gravel, 5 percent cobbles, 5 percent stones and 5 percent boulders; slightly alkaline (pH 7.4); clear smooth boundary.
- C – 12 to 60 inches; pale brown (10YR 6/3) extremely stony loamy coarse sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic;

few very fine roots; many very fine interstitial pores; 20 percent gravel, 20 percent cobbles, 20 percent stones and 10 percent boulders; slightly alkaline (pH 7.4).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 8.2 miles south of Aberdeen, California, in the Owens Valley, 75 feet west of the fence intersecting the road; about 400 feet west and 1,700 feet north of the southeast corner of Section 28, T.12S., R.34E., MDBM, Mount Pinchot Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 61°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The 10 to 40 inch textural control section is extremely stony loamy coarse sand, with 0 to 3 percent clay. Rock fragments are 15 to 20 percent gravel, 5 to 20 percent cobbles, 5 to 20 percent stones and 5 percent boulders, and average 35 to 75 percent by volume. Reaction is neutral to slightly alkaline.

The A horizon has dry color of 10YR 5/3, 6/3, 6/4, 7/2 or 7/3; moist color is 10YR 3/3, 4/3, 5/2 or 5/3. It is loamy sand, gravelly loamy sand, very gravelly loamy sand, bouldery loamy coarse sand and gravelly sand. Rock fragments are 10 to 35 percent gravel, 0 to 20 percent cobbles and 0 to 25 percent stones and boulders, and average 10 to 60 percent by volume. The organic carbon content is 0.2 to 0.4.

The C horizon has dry color of 10YR 5/4, 6/3, 7/2, 7/3 or 7/4; moist color is 10YR 4/3, 4/4, 5/2, 5/3 or 5/4. It is loamy coarse sand, and loamy sand with very cobbly, very stony or extremely stony modifiers.

GUISER FAMILY

The Guiser family consists of moderately deep to very deep, well drained soils forming from metavolcanic and metasedimentary rocks. These soils are on mountain-sides and mountain benches, and have slopes of 15 to 60 percent. Elevation is 7,600 to 11,200 feet. The mean annual precipitation is 12 to 30 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Loamy-skeletal, mixed Mollic Cryoboralfs.

Typical Pedon: The representative profile for this soil is on a north by northwest-facing mountainside, under lodgepole pine, whitebark pine and grasses, at an elevation of 9,880 feet. Slope is 23 percent. When described (7/16/87), the soil was dry in the upper 30 inches and slightly moist in the lower 30 inches. Colors are for dry soil unless otherwise noted.

Oe – 2 to 0 inches; decomposing lodgepole pine and whitebark pine twigs, needles and cones; abrupt smooth boundary.

A1 – 0 to 2 inches; brown (10YR 5/3) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 20 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

A2 – 2 to 9 inches; brown (10YR 5/3) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium, and common coarse roots; many very fine and fine interstitial pores; 25 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

B1 – 9 to 22 inches; yellowish brown (10YR 5/6) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 50 percent gravel and 10 percent cobbles; moderately acid (pH 6.0); clear wavy boundary.

B2 – 22 to 30 inches; brownish yellow (10YR 6/6) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine, fine, medium and

coarse roots; many very fine and fine interstitial pores; 35 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); clear wavy boundary.

Bt1 – 30 to 36 inches; reddish yellow (7.5YR 6/6) gravelly sandy loam, strong brown (7.5YR 5/6) moist; massive; soft, very friable, slightly sticky and slightly plastic; few medium roots; few very fine tubular pores; common thin clay films bridging mineral sand grains and in pores; 20 percent gravel; strongly acid (pH 5.5); clear wavy boundary.

Bt2 – 36 to 47 inches; yellowish brown (10YR 5/6) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; few fine and medium roots; common very fine tubular pores; few thin clay films bridging mineral sand grains; 45 percent gravel and 15 percent cobbles; strongly acid (pH 5.5); gradual wavy boundary.

C – 47 to 60 inches; yellowish brown (10YR 5/6) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; few fine and medium roots; many very fine and fine interstitial pores; 35 percent gravel and 10 percent cobbles; strongly acid (pH 5.5).

Type Location: About 0.65 mile north on Log Cabin Mine road, from its intersection with Highway 120, then 4.75 miles north on west fork, then 0.4 mile on west fork, and 30 feet west of the road; about 80 feet east and 160 feet north of the southeast corner of the northeast quarter of Section 2, T.1N., R.25E., MDBM, Mono Craters SW Quadrangle.

Range in Characteristics: Soil depth to bedrock is 33 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 35°F. The mean summer soil temperature is 43°F. The textural control section is the whole argillic horizon. It is sandy loam, with 7 to 16 percent clay. Rock fragments are 20 to 60 percent gravel and 0 to 15 percent cobbles, and average 44 to 60 percent by volume.

Some pedons have surface layers with sandy loam textures.

The A horizon has dry color of 10YR 5/2 or 5/3; moist color is 10YR 3/2, 3/3 or 4/2. It is loamy sand or loamy

coarse sand, with 2 to 3 percent clay. Rock fragments are 20 to 25 percent gravel by volume. Reaction is very strongly to moderately acid.

The B horizon has dry color of 10YR 5/6, 6/4 or 6/6, or 7.5YR 6/6; moist color is 10YR 4/4, or 7.5YR 5/6. It is sandy loam, with 5 to 16 percent clay. Rock fragments are 20 to 60 percent gravel and 0 to 15 percent cobbles

by volume. Reaction is strongly to slightly acid.

The C horizon has dry color of 10YR 5/6; moist color is 10YR 4/4. It is sandy loam or gravel, with 0 to 8 percent clay. Rock fragments are 35 to 100 percent gravel and 0 to 10 percent cobbles by volume. Reaction is strongly acid.

HAYPRESS FAMILY

The Haypress family consists of very deep, somewhat excessively drained soils forming from granitic, rhyolitic, metasedimentary, basalt and mixed rocks. These soils are on mountainsides, hillsides, basalt flows, morainal debris and mountain toeslopes, and have slopes of 0 to 60 percent. Elevation is 7,500 to 9,600 feet. The mean annual precipitation is about 12 to 25 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Sandy, mixed, frigid Entic Haploxerolls.

Typical Pedon: The representative profile for this soil is on a south by southeast-facing mountainside, under aspen and willow, at an elevation of 9,200 feet. When described (7/13/87), the soil was slightly moist or moist throughout. Colors are for dry soil unless otherwise noted.

Oe – 1 to 0 inches; decomposing aspen plant parts; clear wavy boundary.

A1 – 0 to 1 inch; dark grayish brown (10YR 4/2) loamy sand, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine and coarse roots; many very fine interstitial pores; 10 percent gravel; neutral (pH 7.0); clear wavy boundary.

A2 – 1 to 11 inches; grayish brown (10YR 5/2) loamy sand, very dark gray (10YR 3/1) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium, and common coarse and very coarse roots; many very fine and fine interstitial pores; 5 percent gravel; neutral (pH 7.0); gradual wavy boundary.

A3 – 11 to 22 inches; pale brown (10YR 6/3) loamy sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few medium, and common coarse and very coarse roots; many very fine and fine interstitial pores; 2 percent gravel; slightly acid (pH 6.5); clear irregular boundary.

2Ab1 – 22 to 32 inches; brown (10YR 5/3) very bouldery loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium, and common coarse and very coarse roots; many very fine and fine interstitial pores; 3 percent gravel, 2 percent cobbles and 45 percent boulders; slightly acid (pH

6.5); clear wavy boundary.

2Ab2 – 32 to 40 inches; brown (10YR 5/3) very bouldery loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine and fine interstitial pores; 12 percent gravel, 2 percent cobbles and 40 percent boulders; neutral (pH 7.0); abrupt wavy boundary.

2C1 – 40 to 54 inches; yellowish brown (10YR 5/4) loamy sand, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine and fine interstitial pores; 12 percent gravel; neutral (pH 7.0); clear smooth boundary.

2C2 – 54 to 60 inches; strong brown (7.5YR 5/6) gravelly loamy sand, yellowish red (5YR 4/6) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine and fine interstitial pores; 25 percent gravel; neutral (pH 7.0).

Type Location: About 0.65 mile north on Log Cabin Mine Road, from its intersection with Highway 395, then 1.9 miles on west fork, on the east shoulder of the road; about 330 feet east and 600 feet north of the apparent center of the northeast quarter of Section 12, T.1N., R.25E., MDBM, Mono Craters NW Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The mean annual soil temperature at 20 inches is about 37°F, and the mean summer soil temperature is about 53°F. The difference between the mean summer and the mean winter soil temperatures is greater than 9°F. The 10 to 40 inch textural control section is sandy loam, loamy fine sand, loamy sand or loamy coarse sand, with 2 to 5 percent clay. Rock fragments are 2 to 37 percent gravel, 0 to 35 percent cobbles, 0 to 40 percent stones and 0 to 45 percent boulders, and average 5 to 32 percent by volume.

Some pedons do not have surface organic layers.

The surface A horizon has dry color of 10YR 3/3, 4/2, 4/3, 4/4, 5/2 or 5/3; moist color is 10YR 2/1, 3/2, 3/3, 4/2 or 4/3. It is loamy fine sand, loamy sand or loamy coarse sand, with 1 to 4 percent clay. Rock fragments are 5 to 15 percent by volume. Reaction is strongly acid to neutral.

The other A horizons have dry color of 10YR 4/2, 4/3, 5/2, 5/3 or 6/3; moist color is 10YR 3/1, 3/2 or 3/3. It is loamy fine sand, loamy sand or loamy coarse sand, with 2 to 5 percent clay. Rock fragments are 2 to 25 percent gravel, 0 to 2 percent cobbles and 0 to 45 percent boulders by volume. Reaction is moderately acid to neutral.

The C horizon has dry color of 10YR 4/3, 5/3, 5/4, 6/3 or 6/4, or 7.5YR 5/6, or 5YR 5/3 or 6/3; moist color is 10YR 3/2, 3/3, 3/4, 4/3 or 5/4, or 5YR 3/3, 4/3 or 4/6. It is sandy loam, loamy fine sand, loamy sand or loamy coarse sand, with 2 to 5 percent clay. Rock fragments are 10 to 37 percent gravel and 0 to 35 percent cobbles by volume. Reaction is moderately acid to neutral.

JAYBEE FAMILY

The Jaybee family consists of shallow, well drained soils forming in material weathering from granitic, rhyolitic and basalt rocks. These soils are on hillsides and dissected basalt hillsides, and have slopes of 9 to 60 percent. Elevation is 6,000 to 8,000 feet. The mean annual precipitation is about 10 to 14 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Loamy, mixed, mesic Lithic Xeric Haplargids.

Typical Pedon: The representative profile for this soil is on a north-east facing hillside, under bitterbrush and Mormon tea, at an elevation of 6,540 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; brown (10YR 5/3) extremely cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure, parting to weak very fine granular; soft, friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 35 percent gravel, 25 percent cobbles and 2 percent stones; neutral (pH 7.1); clear wavy boundary.

A2 – 2 to 4 inches; pale brown (10YR 6/3) very cobbly sandy loam, dark grayish brown (10YR 4/2) moist; weak very fine and fine subangular blocky structure, parting to weak very fine granular; soft, friable, nonsticky and nonplastic; common very fine roots; few very fine tubular and interstitial pores; 10 percent gravel, 25 percent cobbles and 2 percent stones; neutral (pH 7.1); clear smooth boundary.

Bw – 4 to 8 inches; brown (10YR 5/3) gravelly loam, dark brown (10Y 3/3) moist; weak medium subangular blocky structure, parting to weak very fine and fine subangular blocky; soft, friable, slightly sticky and slightly plastic; few very fine, fine and medium roots; few very fine tubular pores; 10 percent gravel and 5 percent cobbles; neutral (pH 7.1); clear smooth boundary.

Bt1 – 8 to 11 inches; brown (10YR 5/3) gravelly clay loam, dark brown (10YR 3/3) moist; moderate coarse subangular blocky structure, parting to moderate fine and medium subangular blocky; slightly

hard, firm, sticky and plastic; common very fine, fine and medium roots; few very fine and fine tubular pores; common moderately thick clay films on ped faces; 10 percent gravel and 5 percent cobbles; neutral (pH 7.0); abrupt wavy boundary.

Bt2 – 11 to 15 inches; brown (7.5YR 5/4) gravelly clay loam, dark brown (7.5YR 4/4) moist; strong medium and coarse angular blocky structure, parting to moderate fine angular blocky; hard, firm, sticky and very plastic; few very fine, fine and medium roots; few very fine tubular pores; common moderately thick clay films on ped faces and lining tubular pores; 10 percent gravel and 5 percent cobbles; neutral (pH 7.0); abrupt smooth boundary.

R – 15 inches; hard basalt bedrock.

Type Location: About 330 feet east and 500 feet south of the northwest corner of the northeast quarter of the southeast quarter of Section 29, T.7S., R.32E., MDBM, Bishop SW Quadrangle.

Range in Characteristics: Soil depth to bedrock is 15 to 20 inches. The mean annual soil temperature at 20 inches is about 53°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The textural control section is all of the argillic horizon. It is clay loam or sandy clay loam, with 20 to 40 percent clay. Rock fragments are 10 percent gravel and 0 to 5 percent cobbles by volume.

Some pedons have thin ash surface horizons.

The A horizon has dry color of 10YR 5/3 or 6/3; moist color is 10YR 3/2, 3/3 or 4/2. It is sandy loam or loamy sand, with 2 to 16 percent clay. Rock fragments are 10 to 35 percent gravel, 10 to 25 percent cobbles and 0 to 2 percent stones by volume. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 5/3, 6/3 or 6/4, or 7.5YR 5/4; moist color is 10YR 3/3 or 4/3, or 7.5YR 4/4. It is clay loam, sandy clay loam, loam or sandy loam, with 16 to 40 percent clay. Rock fragments are 10 percent gravel and 0 to 5 percent cobbles by volume. Reaction is slightly acid to neutral.

KILBURN FAMILY

The Kilburn family consists of moderately deep to very deep, well drained soils forming in undifferentiated till, metasedimentary and mixed rocks. These soils are on hillsides, alluvial fans and moraines, and have slopes of 5 to 30 percent. Elevation is 5,600 to 9,300 feet. The mean annual precipitation is about 6 to 20 inches, and the mean temperature is about 46°F.

Taxonomic Class: Loamy-skeletal, mixed, mesic Typic Haploxerolls.

Typical Pedon: The representative profile for this soil is on an east-facing alluvial fan, under big sagebrush and antelope bitterbrush, at an elevation of 7,140 feet. Slope is 10 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 1 inch; brown (10YR 5/3) gravelly loamy sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; common very fine interstitial pores; 25 percent gravel; neutral (pH 6.9); clear smooth boundary.

2A1 – 1 to 3 inches; grayish brown (10YR 5/2) cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure, parting to weak very fine granular; soft, very friable, nonsticky and nonplastic; common very fine and fine, and few medium roots; common very fine interstitial pores; 10 percent gravel, 15 percent cobbles and 5 percent stones; neutral (pH 6.9); abrupt smooth boundary.

2A2 – 3 to 12 inches; brown (10YR 5/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure, parting to weak very fine and fine subangular blocky; soft, very friable, nonsticky and nonplastic; common very fine, fine and medium roots; few very fine and fine interstitial pores; 15 percent gravel and 30 percent cobbles; neutral (pH 6.9); clear wavy boundary.

EB – 12 to 25 inches; yellowish brown (10YR 5/4) extremely cobbly coarse sandy loam, brown (10YR 4/3) moist; moderate medium and coarse subangular blocky structure, parting to moderate fine and medium subangular blocky; slightly hard, friable, nonsticky and nonplastic; few very fine roots; many very fine, and common fine and medium intersti-

tial pores; 45 percent gravel and 25 percent cobbles; neutral (pH 7.0); clear wavy boundary.

Bw – 25 to 60 inches; light yellowish brown (10YR 6/4) extremely cobbly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; extremely hard, friable, slightly sticky and nonplastic; few very fine roots; many very fine, and common fine and medium pores; 45 percent gravel, 25 percent cobbles and 5 percent stones; neutral (pH 6.8).

Type Location: About 165 feet east, and 500 feet south of the apparent center of the northwest quarter of Section 29, T.7S., R.31E., MDBM, Mt. Tom SE Quadrangle.

Range in Characteristics: Soil depth to hard bedrock is 35 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The textural control section is the 10 to 40 inch section in pedons deeper than 40 inches, and is from the 10 inch depth to the lithic contact in pedons shallower than 40 inches. It is sandy loam, coarse loamy sand or loamy sand, with 1 to 18 percent clay. Rock fragments are 15 to 45 percent gravel, 3 to 35 percent cobbles and 0 to 5 percent stones, and average 38 to 71 percent by volume.

The surface A horizon has dry color of 10YR 5/3 or 5/4; moist color is 10YR 3/2, 3/3 or 4/4. It is loamy sand, with 1 to 5 percent clay. Rock fragments are 5 to 85 percent gravel, 0 to 5 percent cobbles and 0 to 6 percent stones by volume. Reaction is slightly acid to neutral.

The other A horizons have dry color of 10YR 5/2, 5/3 or 5/4; moist color is 10YR 3/2, 3/3 or 4/4. It is sandy loam or loamy sand, with 1 to 8 percent clay. Rock fragments are 10 to 40 percent gravel, 5 to 35 percent cobbles and 0 to 5 percent stones by volume. Reaction is neutral.

The B horizon has dry color of 10YR 5/3, 5/4, 6/3, 6/4 or 6/6; moist color is 10YR 3/2, 4/3, 4/4 or 5/4. It is sandy loam or coarse sandy loam, with 5 to 18 percent clay. Rock fragments are 20 to 50 percent gravel, 0 to 25 percent cobbles and 0 to 5 percent stones by volume. Reaction is slightly acid to neutral.

KIONA FAMILY

The Kiona family consists of very deep, well drained soils forming in material weathering from granitic, basalt and sandstone rocks. These soils are on moraine sideslopes, basalt flows and sedimentary terraces, and have slopes of 5 to 60 percent. Elevation is 4,000 to 9,000 feet. The mean annual precipitation is about 4 to 20 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Loamy-skeletal, mixed mesic Xeric Haplocambids

Typical Pedon: The representative profile for this soil is on an east-facing lateral moraine sideslope, under bitterbrush, rabbitbrush and big sagebrush, at an elevation of 5,280 feet. Slope is 40 percent. Colors are for dry soil unless otherwise noted.

A— 0 to 4 inches; light yellowish brown (2.5Y 6/4) extremely stony sandy loam, very dark grayish brown (10YR 3/2) moist; weak thick platy structure, parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic; common very fine roots; few very fine interstitial, and common fine tubular pores; 10 percent gravel, 30 percent cobbles, 35 percent stones and 15 percent boulders; neutral (pH 7.0); clear wavy boundary.

Bw — 4 to 13 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure, parting to moderate very fine subangular blocky; slightly hard, friable, nonsticky and nonplastic; common very fine, and few fine, medium and coarse roots; few fine interstitial and tubular pores; 30 percent gravel, 10 percent cobbles and 5 percent stones; neutral (pH 7.0); clear irregular boundary.

BC — 13 to 35 inches; pale brown (10YR 6/3) extremely cobbly sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; few very fine interstitial pores; 25 percent gravel, 50 percent cobbles and 5 percent stones; neutral (pH 7.0); gradual smooth boundary.

C1 — 35 to 44 inches; pale brown (10YR 6/3) gravelly loamy sand, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 10 percent gravel, 5 percent cobbles and 2 percent stones; neutral (pH 7.0); clear wavy boundary.

C2 — 44 to 55 inches; pale brown (10YR 6/3) loamy sand, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine interstitial pores; 5 percent gravel and 5 percent cobbles; neutral (pH 7.1); abrupt wavy boundary.

2C3 — 55 to 65 inches; yellowish brown (10YR 5/4) very cobbly sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; 10 percent gravel, 20 percent cobbles and 5 percent stones; neutral (pH 7.1).

Type Location: About 2,475 feet west and 2,640 feet north of the southwest corner of the irregularly shaped Section 26, T.9S., R.33E., MDBM, Big Pine NE Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The mean annual soil temperature at 20 inches is 53°F. The mean summer soil temperature is 69°F, and the mean winter soil temperature is 36°F. The 10 to 40 inch textural control section is loam, sandy loam or loamy sand, with 2 to 12 percent clay. Rock fragments are 10 to 55 percent gravel, 0 to 50 percent cobbles and 0 to 30 percent stones, and average 52 to 68 percent by volume.

Some pedons are moderately deep to bedrock. Other pedons have A horizons with sand or loamy sand textures.

The A horizon has dry color of 2.5Y 6/4, or 10YR 5/3 or 6/2; moist color is 10YR 3/2, or 7.5YR 3/2 or 4/2. It is loam or sandy loam, with 4 to 12 percent clay. Rock fragments are 5 to 30 percent gravel, 5 to 30 percent cobbles, 0 to 35 percent stones and 0 to 15 percent boulders by volume. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 5/3, 6/3 or 6/4; moist color is 10YR 4/3 or 5/4. It is loam or sandy loam, with 6 to 12 percent clay. Rock fragments are 15 to 50 percent gravel, 10 to 50 percent cobbles and 4 to 30 percent stones by volume. Reaction is neutral.

The C horizon has dry color of 10YR 5/4 or 6/3, or N2/0; moist color is 2.5Y 4/2, or 10YR 5/4, or N2/0. It is sandy loam, loamy sand or sand, with 2 to 6 percent clay. Rock fragments are 5 to 55 percent gravel, 5 to 20 percent cobbles and 0 to 5 percent stones by volume. Reaction is neutral.

KOEHLER FAMILY

The Koehler family consists of moderately deep to deep, well to somewhat excessively drained soils forming in alluvium derived from mixed rocks. These soils are on alluvial fans and valley bottoms, and in depressions, and have slopes of 0 to 15 percent. Elevation is 6,500 to 8,000 feet. The mean annual precipitation is about 8 to 15 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Sandy, mixed, mesic Xeric Haplo-durids

Typical Pedon: The representative profile for this soil is on a southwest-facing alluvial fan, sagebrush, bitterbrush, rabbitbrush, Great Basin wildrye, squirreltail and Indian ricegrass, at elevation of 7,100 feet. Slope is 3 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 3 inches; light brownish gray (10YR 6/2) loamy sand, dark grayish brown (10YR 4/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; few medium interstitial pores; slightly acid (pH 6.4); clear smooth boundary.

B1 – 3 to 10 inches; pale brown (10YR 6/3) loamy sand, dark brown (10YR 4/3) moist; weak fine and medium grading to weak very fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine roots; few very fine interstitial pores; neutral (pH 6.7); clear wavy boundary.

B2 – 10 to 37 inches; pale brown (10YR 6/3) loamy sand, dark brown (10YR 4/3) moist; massive; hard,

friable, nonsticky and nonplastic; few very fine roots; neutral (pH 6.8); abrupt smooth boundary; durinodes are present.

B3qkm – 37 inches; Silica-calcium carbonate duripan; massive, extremely hard; opal coating on upper surface; neutral (pH 7.3).

Type Location: About 100 southeast of the northwest corner of the northwest quarter of the northeast quarter of Section 30, T.3S., R.31E., MDBM, Casa Diablo Mtn. NE Quadrangle.

Range in Characteristics: Soil depth ranges from 20 to greater than 40 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean annual summer soil temperature is about 69°F, and the mean winter soil temperature is about 50°F. The 10 to 37 inch control section is sand, loamy sand or sandy loam, with 0 to 5 percent clay. Rock fragments are 0 to 10 percent gravel. Duripan depth varies from 20 to 40 inches.

The A horizon has dry color of 10YR 5/3, 6/3 or 6/2; moist color is 10YR 4/3 or 4/2. It is a sand, loamy sand or sandy loam, with 0 to 4 percent clay. Rock fragments are 0 to 10 percent gravel. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 6/3, 6/2 or 5/3; moist color is 10YR 4/3 or 3/3. It is sand, loamy sand or sandy loam, with 0 to 5 percent clay. Rock fragments are 0 to 10 percent gravel. Reaction is neutral to slightly alkaline.

LABSHAFT FAMILY

The Labshaft family consists of shallow, well drained soils forming in material weathering from mixed rocks. These soils are on mountainsides and hillsides, and have slopes of 15 to 60 percent. Elevation is 9,600 to 12,300 feet. The mean annual precipitation is about 20 to 30 inches, and the mean annual temperature is about 38°F.

Taxonomic Class: Loamy-skeletal, mixed Lithic Cryoborolls.

Typical Pedon: The representative profile for this soil is on a southeast-facing mountainside, under big sagebrush and bunchgrasses, at an elevation of 9,600 feet. Colors are for dry soil unless otherwise noted.

A – 0 to 2 inches; grayish brown (10YR 5/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure, parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 35 percent gravel, 15 percent cobbles and 5 percent stones; neutral (pH 6.8); clear smooth boundary.

BA – 2 to 6 inches; brown (10YR 5/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure, parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic, many very fine, and common fine roots; many very fine interstitial pores; 25 percent gravel, 5 percent cobbles and 5 percent stones; neutral (pH 6.9); clear wavy boundary.

Bw1 – 6 to 10 inches; brown (10YR 5/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic, common very fine and few fine roots; common very fine interstitial pores; 35 percent gravel and 5 percent cobbles; neutral (pH 6.9); clear wavy boundary.

Bw2 – 10 to 13 inches; grayish brown (10YR 5/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure, parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine interstitial pores; 35 percent gravel and 15 percent cobbles; neutral (pH 6.9); clear wavy boundary.

R – 13 inches; hard adamellite bedrock.

Type Location: About 990 feet east and 660 feet north of the southwest corner of Section 17, T.8S., R.32E., MDBM, Big Pine NW Quadrangle.

Range in Characteristics: Soil depth to bedrock is 10 to 20 inches. The mean annual soil temperature at the lithic contact is about 41°F, and the mean summer soil temperature is about 53°F. The textural control section is from the 10 inch depth to the lithic contact in pedons deeper than 14 inches, or is the whole soil in pedons 14 inches or less deep to bedrock. It is sandy clay loam, loam, sandy loam or loamy sand, with 3 to 25 percent clay, and a weighted average of 8 to 24 percent. Rock fragments are 25 to 40 percent gravel, 5 to 15 percent cobbles and 0 to 5 percent stones, and average 43 to 67 percent by volume.

The A horizon has dry color of 10YR 5/2 or 5/3; moist color is 10YR 3/2 or 3/3. It is sandy loam or loamy sand, with 3 to 6 percent clay. Rock fragments are 25 to 35 percent gravel, 5 to 15 percent cobbles and 0 to 5 percent stones by volume. Reaction is neutral.

The B horizon has dry color of 10YR 4/3, 5/2 or 5/3; moist color is 10YR 3/2 or 3/3. It is sandy clay loam, loam or sandy loam, with 6 to 25 percent clay. Rock fragments are 25 to 40 percent gravel, 5 to 30 percent cobbles and 0 to 5 percent stones by volume. Reaction is neutral.

LAKASH FAMILY

The Lakash family consists of very deep, somewhat excessively drained soils forming in materials weathering from pumice and ash. These soils are on hillsides and terraces, and have slopes of 0 to 15 percent. Elevation is 6,500 to 7,300 feet. The mean annual precipitation is about 6 to 12 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Ashy-pumiceous, mesic Vitrandic Torriorthents.

Typical Pedon: The representative profile for this soil is on an east by northeast-facing hillside, under Wyoming big sagebrush, low sagebrush, and antelope bitterbrush, at an elevation of 6,760 feet. Slope is 8 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 1 inch; light brownish gray (10YR 6/2) gravelly coarse sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; many very fine and fine interstitial pores; 17 percent pumice and obsidian gravel, 2 to 20 mm in diameter; strongly acid (pH 5.3); clear wavy boundary.

A2 – 1 to 5 inches; pale brown (10YR 6/3) very gravelly coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, coarse and very coarse roots; many very fine and fine interstitial pores; 38 percent pumice and obsidian gravel, 2 to 20 mm in diameter; strongly acid (pH 5.5); clear wavy boundary.

C1 – 5 to 7 inches; light gray (2.5Y 7/2) gravelly loamy sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and very coarse, and common medium and coarse roots; many very fine and fine interstitial pores; 31 percent pumice and obsidian gravel, 2 to 20 mm in diameter; moderately acid (pH 5.7); clear smooth boundary.

C2 – 7 to 12 inches; light gray (2.5Y 7/2) gravelly coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and very coarse, and common medium and coarse roots; many very fine and fine interstitial pores; 17 percent pumice and obsidian gravel, 2 to 20 mm in diameter; moderately acid (pH 5.8); clear smooth boundary.

C3 – 12 to 17 inches; light gray (2.5Y 7/2) gravelly coarse

sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and very coarse, and common medium and coarse roots; many very fine and fine interstitial pores; 25 percent pumice and obsidian gravel, 2 to 20 mm in diameter; moderately acid (pH 5.8); clear smooth boundary.

2C4 – 17 to 24 inches; light gray (2.5Y 7/2) coarse sand, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, medium and coarse roots; many very fine and fine interstitial pores; 10 percent pumice and obsidian gravel, 2 to 20 mm in diameter; moderately acid (pH 5.7); clear smooth boundary.

3C5 – 24 to 31 inches; light gray (10YR 7/2) gravelly coarse sand, light gray (10YR 7/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine, and few medium roots; few very fine, and many fine and medium interstitial pores; 30 percent pumice and obsidian gravel, 2 to 20 mm in diameter; moderately acid (pH 5.7); clear wavy boundary.

4C6 – 31 to 46 inches; variegated white and light gray (N8/0 and 2.5Y 7/2) extremely gravelly coarse sand, light brownish gray and white (10YR 6/2 and 10YR 8/1) moist; single grain, loose, nonsticky and nonplastic; few very fine, fine and medium roots; few very fine and many fine and medium interstitial pores; 80 percent pumice and obsidian gravel, 2 to 20 mm in diameter; neutral (pH 6.6); abrupt smooth boundary.

5C7 – 46 to 56 inches; white (10YR 8/1) gravelly loamy coarse sand, light gray (10YR 6/1) moist; weak very fine platy structure, parting to weak coarse platy; soft, very friable, nonsticky and nonplastic; many very fine and fine interstitial pores; 19 percent pumice and obsidian gravel, mostly 3 to 40 mm in diameter; strongly alkaline (pH 8.7); abrupt smooth boundary.

6C8 – 56 to 60 inches; variegated white and light gray (N8/0 and N6/0) extremely gravelly coarse sand, gray and white (10YR 5/1 and 10YR 8/1) moist; single grain; loose, nonsticky and nonplastic; common very fine, and many fine and medium interstitial pores; 80 percent pumice and obsidian gravel, mostly 3 to 40 mm in diameter; moderately

alkaline (pH 8.0).

Type Location: About 4.15 miles east on Highway 120, from its intersection with Highway 395, on south shoulder of road; about 330 feet west and 165 feet north of the southeast corner of Section 19, T.1N., R.27E., MDBM, Mono Craters Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The soil moisture control section is at 13 to 60 inches. It is usually dry from mid-April to late November, and is usually moist in some parts the rest of the year. The 10 to 40 inch textural control section is loamy sand, coarse loamy sand, sand, coarse sand or gravel, with 0 to 2 percent clay. Rock fragments are 10 to 100 percent gravel, and average 39 to 42 percent by volume. The upper part of the textural control section averages 10 to 20 percent gravel, and the lower part averages 46 to 58 percent gravel by volume.

Pumice gravel makes up 90 to 100 percent of the total rock fragments by volume in both parts. Obsidian rock fragments make up the remainder of the rock fragments.

Some pedons have coarse loamy sand surface textures.

The A horizon has dry color of 10YR 5/1, 6/1, 6/2 or 6/3; moist color is 10YR 3/1, 3/2, 4/2, 5/2, or 5/3. It is coarse sand, with 0 to 2 percent clay. Rock fragments are 10 to 38 percent gravel and 0 to 5 percent cobbles by volume. Gravel is mostly pumice, with minor amounts of obsidian, and cobbles are obsidian. Reaction is strongly acid.

The C horizon has dry color of N6/0 or N8/0, or 2.5Y 7/2, or 10YR 6/2, 7/2 or 8/1; moist color is 2.5Y 5/2 or 7/2, 10YR 4/2, 5/1, 5/2, 5/3, 6/1, 7/2 or 8/1. It is loamy sand, loamy coarse sand, sand, coarse sand or gravel, with 0 to 2 percent clay. Rock fragments are 10 to 80 percent gravel by volume. The gravel is mostly pumice, with minor amounts of obsidian. Reaction is moderately acid to strongly alkaline.

LITHIC CRYORTHENTS

These Lithic Cryorthents consist of shallow, well drained soils forming in material weathering from mixed granitic rocks. These soils are on mountainsides, and have slopes of 15 to 80 percent. Elevation is 5,000 to 13,000 feet. The mean annual precipitation is 6 to 30 inches, and the mean annual temperature is about 40°F.

Taxonomic Class: Lithic Cryorthents

Typical Pedon: The representative profile for this soil is on a southwest-facing mountainside, under antelope bitterbrush and big sagebrush, at an elevation of 11,200 feet. Colors are for dry soil unless otherwise noted.

A – 0 to 2 inches; pale brown (10YR 6/3) extremely stony loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine and medium roots; common medium interstitial pores; 35 percent gravel, 10 percent cobbles, 15 percent stones and 5 percent boulders; moderately acid (pH 6.0); abrupt smooth boundary.

C1 – 2 to 8 inches; pale brown (10YR 6/3) very stony loamy sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; few very fine and fine tubular pores; 20 percent gravel, 15 percent stones and 5 percent boulders; slightly acid (pH 6.4); clear smooth boundary.

C2 – 8 to 18 inches; light yellowish brown (2.5Y 6/4) gravelly loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine roots; few very fine and fine tubular,

and many medium interstitial pores; 30 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); abrupt smooth boundary.

R – 18 inches; hard adamellite bedrock.

Type Location: About 165 feet west and 330 feet north of the southeast corner of Section 21, T.5S., R.30E., MDBM, Mt. Tom NW Quadrangle.

Range in Characteristics: Soil depth is 16 to 18 inches deep to the lithic contact. The mean annual soil temperature at 20 inches or bedrock, whichever is deeper, is about 41°F, and the mean summer soil temperature is about 53 °F. The textural control section is the 10 inch to lithic contact section. It is loamy sand or loamy coarse sand, with 1 to 10 percent clay. Rock fragments are 30 to 65 percent gravel, 10 to 24 percent cobbles and 0 to 2 percent boulders, and average 30 to 88 percent by volume.

The A horizon has dry color of 10YR 6/2, 6/3 or 6/4; moist color is 10YR 3/2, 4/2 or 4/4. It is loamy sand or loamy coarse sand, with 1 to 10 percent clay. Rock fragments are 35 to 45 percent gravel, 10 to 25 percent cobbles, 0 to 15 percent stones and 0 to 5 percent boulders by volume. Reaction is moderately to very strongly acid.

The C horizon has dry color of 10YR 6/3, 6/4 or 7/2, or 2.5Y 6/4; moist color is 10YR 3/3, 4/3, 4/4 or 5/3. It is loamy sand or loamy coarse sand, with 1 to 9 percent clay. Rock fragments are 20 to 65 percent gravel, 0 to 25 percent cobbles, 0 to 15 percent stones and 0 to 5 percent boulders by volume. Reaction is strongly to slightly acid.

LUBKIN FAMILY

The Lubkin family consists of very deep, well drained soils forming in alluvium, mainly from granitic sources. These soils are on alluvial fans and fan terraces, and have slopes of 5 to 15 percent. Elevation is 4,400 to 6,000 feet. The mean annual precipitation is about 4 to 8 inches, and the mean annual temperature is about 56°F.

Taxonomic Class: Loamy-skeletal, mixed, thermic Xeric Haplagrids

Typical Pedon: The representative profile for this soil is on an east-facing alluvial fan, under spiney hopsage, Nevada ephedra and desert needlegrass, at an elevation of 4,200 feet. Slope is 5 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 5 inches; light yellowish brown (10YR 6/4) gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; many very fine and few fine interstitial pores; carbonates coat rock fragments; 20 percent gravel, 5 percent cobbles, 5 percent stones and 3 percent boulders; neutral (pH 6.8); clear wavy boundary.

Btk1 – 5 to 13 inches; light gray (2.5Y 7/2) very bouldery sandy loam, olive brown (2.5Y 4/4) moist; weak coarse and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and few fine, medium and coarse roots; common very fine and few fine and fine vesicular pores; many thick clay films in pores; carbonates coat rock fragments; 20 percent boulders; neutral (pH 7.2); clear smooth boundary.

Btk2 – 13 to 26 inches; light gray (2.5Y 7/2) very bouldery sandy loam, olive brown (2.5Y 4/4) moist; weak very coarse subangular blocky structure; hard, friable, nonsticky and nonplastic; common very fine and few fine, medium and coarse roots; common very fine tubular and interstitial pores; common thin clay films bridging sandgrains; strongly effervescent, with few medium and large soft masses; carbonates coat rock fragments; 15 percent gravel, 15 percent cobbles, 15 percent stones and 5 percent boulders; neutral (pH 7.2); diffuse smooth boundary.

Bk – 26 to 46 inches; light gray (2.5Y 7/2) very bouldery

loamy sand, olive brown (2.5Y 4/4) moist; massive; hard, friable, nonsticky and nonplastic; few very fine through medium roots; many very fine tubular and common very fine interstitial pores; strongly effervescent, with common medium and large soft carbonate masses; carbonates coat rock fragments; 15 percent gravel, 15 percent cobbles, 5 percent stones and 2 percent boulders; neutral (pH 6.8); abrupt smooth boundary.

2C1 – 46 to 69 inches; light gray (2.5Y 7/2) very gravelly loamy sand, olive brown (2.5Y 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and few fine interstitial pores, and many very fine tubular pores; strongly effervescent, with few medium and large soft carbonate masses; carbonates coat rock fragments; 35 percent gravel and 2 percent cobbles; neutral (pH 7.0); gradual smooth boundary.

2C2 – 69 to 85 inches; light gray (2.5Y 7/2) very gravelly loamy sand, olive brown (2.5Y 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine tubular and interstitial pores; carbonates coat rock fragments; 35 percent gravel and 2 percent cobbles; neutral (pH 7.2).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 5 miles south of Independence, California; about 1,700 feet east and 800 feet south of the northwest corner of Section 16, T.14N., R.35E., MDBM, Lone Pine Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. Thickness of the solum is 20 to 50 inches. The mean annual soil temperature at 20 inches is about 62°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The textural control section is the whole argillic if less than 20 inches thick and the upper 20 inches of argillic if greater than 20 inches thick. The soil is neutral to slightly alkaline, and is non-effervescent to strongly effervescent.

The A horizon has dry color of 10YR 5/3, 6/3 or 6/4; moist color is 10YR 4/2, 3/3, 4/3 or 4/4. It is sandy loam, with 5 to 10 percent clay. Rock fragments are 15 to 30 percent gravel, 0 to 10 percent cobbles and 0 to 10 percent stones and boulders, and averages 15 to 35 percent by volume.

The Btk horizon has dry color of 2.5Y 7/2, 7/4 or 6/2, or 10YR 6/4 or 5/4; moist color is 2.5Y 4/4, or 10YR 4/3, 3/4 or 4/4. It is loamy sand or sandy loam, with 10 to 15 percent clay. Rock fragments are 15 to 25 percent gravel, 5 to 25 percent cobbles and 5 to 10 percent stones and boulders, and averages 35 to 60 percent by volume.

The Bk horizon has dry color of 2.5Y 6/4 or 7/2, or 10YR 5/4 or 6/4; moist color is 2.5Y 4/4, or 10YR 3/4 or 4/4. It is sandy loam, with 10 to 18 percent clay. Rock fragments are 15 to 30 percent gravel, 5 to 20 percent

cobbles and 5 to 25 percent stones and boulders, and averages 35 to 60 percent by volume.

The C horizon has dry color of 2.5Y 5/2, 6/2 or 7/2, or 10YR 5/4 or 6/4; moist color is 2.5Y 4/2 or 4/4, or 10YR 3/4, 3/6 or 4/6. It is sand, loamy sand or sandy loam, with 5 to 10 percent clay. Rock fragments are 15 to 45 percent gravel, 5 to 20 percent cobbles and 5 to 20 percent stones and boulders, and averages 35 to 60 percent by volume.

MASCAMP FAMILY

The Mascamp family consists of shallow, well drained soils forming in material weathering from granitic, meta-sedimentary and mixed rocks. These soils are on hillsides, hilltops, mountainsides and mountaintops, and have slopes of 15 to 60 percent. Elevation is 6,400 to 9,300 feet. The mean annual precipitation is about 8 to 20 inches, and the mean annual temperature is about 44°F.

Taxonomic Class: Loamy-skeletal, mixed, frigid Lithic Argixerolls.

Typical Pedon: The representative profile for this soil is on an east-facing hillside, under pinyon pine, sagebrush and bitterbrush, at an elevation of 8,000 feet. Colors are for dry soil unless otherwise noted.

- A1 – 0 to 2 inches; brown (10YR 4/3) extremely cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many medium interstitial pores; 20 percent gravel, 65 percent cobbles and 5 percent stones; slightly acid (pH 6.3); clear wavy boundary.
- A2 – 2 to 7 inches; brown (10YR 5/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; many medium interstitial pores; 5 percent gravel, 45 percent cobbles and 5 percent stones; slightly acid (pH 6.4); clear wavy boundary.
- Bt1 – 7 to 11 inches; dark yellowish brown (10YR 4/4) very cobbly sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common very fine, and few fine, medium and coarse roots; common very fine, fine and medium tubular pores; few thin clay films on ped faces and lining tubular pores; 20 percent gravel and 25 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.
- Bt2 – 11 to 19 inches; dark yellowish brown (10YR 4/4) very cobbly sandy loam, brown (10YR 4/3) moist;

moderate very fine and fine subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine, and few medium tubular pores; few thin clay films on ped faces and lining tubular pores; 20 percent gravel and 30 percent cobbles; slightly acid (pH 6.4); abrupt wavy boundary.

R – 19 inches; hard granitic bedrock.

Type Location: About 165 feet west and 600 feet north of the southeast corner of the southwest quarter of irregular Section 6, T.3S., R.31E., MDBM, Casa Diablo Mountain NE Quadrangle.

Range in Characteristics: Soil depth to hard bedrock is 9 to 19 inches. The mean annual soil temperature at the lithic contact is about 44°F, and the mean summer soil temperature is about 61°F. The difference between the mean summer and the mean winter soil temperatures is greater than 9°F. The textural control section is the whole argillic horizon in pedons deeper than 14 inches, or the whole soil in pedons 14 inches or less deep. It is sandy loam or coarse sand, with 1 to 18 percent clay, and a weighted average of 14 to 18 percent clay. Rock fragments are 0 to 60 percent gravel, 0 to 30 percent cobbles and 0 to 2 percent stones, and average 41 to 58 percent by volume.

Some pedons have A horizons with coarse sand textures. Other pedons have transitional B horizons, and some have a C horizon underlying the argillic horizon.

The A horizon has dry color of 10YR 4/3, 5/2 or 5/3; moist color is 10YR 3/2 or 3/3. It is sandy loam or loamy sand, with 3 to 10 percent clay. Rock fragments are 5 to 55 percent gravel, 10 to 65 percent cobbles, 2 to 5 percent stones and 0 to 2 percent boulders by volume. Reaction is slightly acid to neutral.

The Bt horizon has dry color of 10YR 4/4, 5/3 or 5/4; moist color is 10YR 3/3 or 4/3, or 2.5Y 3/2. It is loam or sandy loam, with 12 to 20 percent clay. Rock fragments are 0 to 50 percent gravel and 0 to 30 percent cobbles by volume. Reaction is slightly acid to neutral.

MOTTSVILLE FAMILY

The Mottsville family consists of very deep, somewhat excessively drained soils forming from granitic rocks and alluvium derived from granitics and mixed rocks. These soils are on terrace sideslopes, mountain toeslopes and glacial outwash fans, and have slopes of 0 to 30 percent. Elevation is 4,000 to 8,500 feet. The mean annual precipitation is about 4 to 17 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Sandy, mixed, mesic Torripsamentic Haploxerolls

Typical Pedon: The representative profile for this soil is on a northwest-facing alluvial terrace sideslope, under big sagebrush, rabbitbrush and grasses, at an elevation of 6,920 feet. Slope is 5 percent. Colors are dry soil unless otherwise noted.

Oi – 1/4 to 0 inch; decomposed and decomposing big sagebrush leaves and twigs; abrupt smooth boundary.

A1 – 0 to 4 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; 20 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

A2 – 4 to 19 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many fine interstitial pores; 15 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

AB – 19 to 25 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure;

soft, very friable, nonsticky and nonplastic; many fine medium roots; common very fine interstitial pores; 15 percent gravel; neutral (pH 6.8); clear smooth boundary.

C1 – 25 to 60 inches; grayish brown (10YR 5/2) gravelly loamy sand, dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine, medium and coarse roots; common very fine interstitial pores; 30 percent gravel; neutral (pH 7.0).

Type Location: About 100 northeast of the southeast corner of the southwest quarter of the northeast quarter of Section 33, T.2S., R.29E., MDBM, Mt. Morrison NE Quadrangle.

Range in Characteristics: Soil depth is 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 47°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The 10 to 40 inch textural control section is loamy sand, loamy coarse sand or coarse sand, with 1 to 4p percent clay. Rock fragments are 0 to 30 percent gravel and 0 to 15 percent cobbles, and average 0 to 30 percent by volume.

Some pedons lack thin surface organic layers.

The A horizon has dry color of 10YR 5/3 or 5/2; moist color of 3/3 or 3/2. It is sandy loam, loamy coarse sand or loamy coarse sand, with 1 to 6 percent clay. Rock fragments are 0 to 20 percent gravel by volume. Reaction is moderately acid to neutral.

The C horizon has dry color of 10YR 6/4, 5/4 or 5/2; moist color is 10YR 5/4, 4/4, 4/3, 3/3 or 3/2. It is loamy sand or loamy coarse sand, with 3 to 6 percent clay. Rock fragments are 5 to 30 percent gravel and 0 to 15 percent cobbles by volume. Reaction is neutral.

NANAMKIN FAMILY

The Nanamkin family consists of moderately deep to very deep, somewhat excessively drained soils forming in materials weathering from granitic, basalt and mixed rocks. These soils are on mountainsides, moraines, alluvial fan ridges and hillsides, and have slopes of 0 to 80 percent. Elevation is 4,800 to 13,000 feet. The mean annual precipitation is about 6 to 30 inches, and the mean annual temperature is about 40°F.

Taxonomic Class: Sandy-skeletal, mixed, frigid Typic Xerorthents.

Typical Pedon: The representative profile for this soil is on a northeast-facing mountainside, under rabbitbrush, antelope bitterbrush, and timothy, at an elevation of 9,300 feet. Slope is 22 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; brown (10YR 5/3) very cobbly loamy sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 30 percent gravel, 20 percent cobbles, 5 percent stones, and 5 percent boulders; neutral (pH 7.0); clear smooth boundary.

A2 – 2 to 7 inches; brown (10YR 5/3) very cobbly loamy sand, dark brown (10YR 3/3) moist; weak medium subangular blocky structure, parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic; many very fine and fine, and few medium roots; many very fine interstitial pores; 25 percent gravel and 15 percent cobbles; neutral (pH 7.0); clear wavy boundary.

C1 – 7 to 24 inches; yellowish brown (10YR 5/4) very cobbly loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; 20 percent gravel and 25 percent cobbles; neutral (pH 7.0); clear wavy boundary.

C2 – 24 to 60 inches; yellowish brown (10YR 5/4) very cobbly loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine interstitial pores; 20 percent gravel and 25 percent cobbles; neutral (pH 7.1).

Type Location: About 0.3 mile east and 0.2 mile south of the northwest corner of Section 7, T.8S., R.32E., MDBM, Mt. Tom Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The mean annual soil temperature at 20 inches is about 42°F, and the mean summer soil temperature is about 60°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The soil moisture control section is 15 to 60 inches. It is usually dry from early June to mid-November, and is usually moist the rest of the year. The 10 to 40 inch textural control section is loamy sand, coarse loamy sand or sand, with 3 to 13 percent clay. Rock fragments are 10 to 60 percent gravel, 0 to 35 percent cobbles, 0 to 20 percent stones and 0 to 21 percent boulders, and average 37 to 95 percent by volume.

Some pedons have fresh and decomposing organic surface layers up to 1 inch thick. Other pedons are 21 to 40 inches deep to hard bedrock.

The surface A horizon has dry color of 10YR 4/2, 5/2, 5/3 or 6/2; moist color is 10YR 3/2, 3/3, 4/2 or 4/3. It is loamy sand or coarse loamy sand, with 2 to 12 percent clay. Rock fragments are 5 to 50 percent gravel, 0 to 30 percent cobbles, 0 to 20 percent stones, and 0 to 15 percent boulders by volume. Reaction is strongly acid to neutral.

The other A horizons have dry color of 10YR 4/2, 5/3, 6/2, 6/3 or 6/4; moist color is 10YR 3/2, 3/3, 4/2, 4/3 or 5/3. They are sandy loam, loamy sand or coarse loamy sand, with 2 to 10 percent clay. Rock fragments are 10 to 35 percent gravel, 0 to 25 percent cobbles, 0 to 20 percent stones and 0 to 21 percent boulders by volume. Reaction is strongly acid to neutral.

The C horizon has dry color of 2.5Y 6/4, or 10YR 5/3, 5/4, 6/3, 6/4, 7/2, 7/3 or 8/3, or 7.5YR 5/8; moist color is 10YR 4/3, 4/4, 5/2, 5/3 or 6/3, or 7.5YR 4/4 or 4/6. It is loamy sand, coarse loamy sand or sand, with 3 to 13 percent clay. Rock fragments are 20 to 60 percent gravel, 0 to 35 percent cobbles, 0 to 25 percent stones and 0 to 21 percent boulders by volume. Reaction is strongly acid to neutral.

NEUSKE FAMILY

The Nueske family consists of moderately deep to very deep well drained soils forming from granitic, metasedimentary and basalt rocks. These soils are on mountainsides and hillsides, and have slopes of 15 to 60 percent. Elevation is 6,400 to 9,400 feet. The mean annual precipitation is about 6 to 20 inches, and the mean annual temperature is 44°F.

Taxonomic Class: Fine-loamy, mixed, frigid Mollic Haploxeralfs

Typical Pedon: The representative profile for this soil is on a northeast-facing hillside, under pinyon pine, big sagebrush and antelope bitterbrush, at an elevation of 7,800 feet. Slope is 35 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 2 inches; brown (10YR 4/3) gravelly fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft; very friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; 25 percent gravel and 5 percent cobbles; slightly acid (pH 6.2); clear wavy boundary.

BE – 2 to 5 inches; brown (10YR 4/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure, parting to weak fine granular; soft, very friable, slightly sticky and nonplastic; common very fine, and few fine roots; common very fine and few fine tubular pores; 15 percent gravel; slightly acid (pH 6.4); clear wavy boundary.

Bt1 – 5 to 12 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; moderate medium and coarse subangular blocky structure, parting to moderate fine subangular blocky; slightly hard, firm, slightly sticky and plastic; common very fine, and few fine, medium and coarse roots; few very fine and fine tubular pores; few thin clay films on ped faces, in pores and bridging mineral grains; 10 percent gravels; neutral (pH 6.6); clear wavy boundary.

Bt2 – 12 to 20 inches; light yellowish brown (2.5Y 6/4) clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium and coarse subangular structure, parting to moderate fine and medium angular blocky; slightly hard, firm, slightly sticky and plastic; few fine, medium and coarse roots; few very fine and fine tubular pores; few thin

clay films in pores and bridging mineral grains; 5 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

C1 – 20 to 44 inches; light yellowish brown (2.5Y 6/4) very cobbly loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; many medium interstitial pores; 15 percent gravel and 20 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

Cr – 44 inches; soft weathered granitic and metasedimentary bedrock.

Type Location: About 100 feet east and 1,600 feet south of the northwest corner of Sec. 9, T.3S., R.31E., MDBM, Casa Diablo Mountain NE Quadrangle.

Range in Characteristics: Soil depth to the paralithic contact is 38 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 44°F. The difference between the mean annual summer and winter soil temperatures is greater than 9°F. The textural control section is the whole argillic, or the upper 20 inches of the argillic in pedons where the argillic is thicker than 20 inches. It is a sandy loam, sandy clay loam or clay loam, with 8 to 34 percent clay, and a weighted average of 19 to 30 percent. Rock fragments are 5 to 25 percent gravel and 0 to 35 percent cobbles, and average 7 to 32 percent by volume. Reaction is slightly acid to neutral throughout the profile.

The A horizon has dry color of 10YR 4/3, 5/3, 5/4, 6/2 or 6/3; moist color is 10YR 3/2 or 3/3. It is a fine sandy loam and sandy loam, with 3 to 8 percent clay. Rock fragments are 5 to 50 percent gravel, 0 to 20 percent cobbles and 0 to 5 percent stones by volume.

The B horizon has dry color of 10YR 4/3, 5/4 or 6/4, or 2.5Y 6/4; moist color is 10YR 3/2, 4/4 or 4/6 or 7.5YR 3/2, or 2.5Y 4/4. It is a clay loam, sandy clay loam, loam or sandy loam, with 8 to 34 percent clay. Rock fragments are 5 to 25 percent gravel and 0 to 35 percent cobbles by volume.

The C horizon has dry color of 10YR 5/4 or 7/4, or 2.5Y 6/4; moist color is 10YR 5/6, or 5YR 3/4, or 2.5Y 4/4. It is a clay loam, loam or loamy sand, with 4 to 34 percent clay. Rock fragments are 15 to 45 percent gravel and 0 to 20 percent cobbles by volume.

OLA FAMILY

The Ola family consists of moderately deep, well drained soils forming in material weathering from basalt. These soils are on mountainsides and benches, and have slopes of 15 to 30 percent. Elevation is 7,500 to 10,200 feet. The mean annual precipitation is about 12 to 30 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Coarse-loamy, mixed, frigid Pachic Haploxerolls

Typical Pedon: The representative profile for this soil is on an east-facing bench, under bitterbrush, big sagebrush, rabbitbrush, Indian ricegrass and bunchgrasses, at an elevation of 9,000 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; dark grayish brown (10YR 4/2) sandy loam, very dark gray (10YR 3/1) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, common fine and few medium roots; many fine interstitial pores; slightly acid (pH 6.1); clear smooth boundary.

A2 – 2 to 8 inches; brown (10YR 4/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky grading to weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, common fine and few medium roots; many fine interstitial pores; slightly acid (pH 6.3); clear wavy boundary.

A3 – 8 to 12 inches; brown (10YR 4/3) sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine, common fine and few medium roots; many fine interstitial pores; slightly acid (pH 6.4); abrupt smooth boundary.

B1 – 12 to 23 inches; brown (10YR 5/3) cobbly sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; common fine interstitial pores; 10 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

B2 – 23 to 30 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few interstitial pores; neutral (pH 6.6); gradual smooth boundary.

B3 – 30 to 38 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; neutral (pH 6.6); abrupt smooth boundary.

R – 38 inches; hard basalt bedrock

Type Location: About 200 feet from the southwest corner of the southwest quarter of the southwest quarter of Section 35, T.2S., R.30E., MDBM, Casa Diablo Mtn NW Quadrangle.

Range in Characteristics: Soil depth is 21 to 40 to lithic contact. The mollic epipedon is 18 to 25 inches thick. The mean annual soil temperature at 20 inches is about 47°F. The mean summer temperature is about 62°F, and the mean winter temperature is about 33°F. The textural control section is 10 inch to lithic contact portion in less than 40 inches to bedrock, and is 10 to 40 inch section in soils greater than 40 inches to bedrock. It is sandy loam, with 3 to 16 percent clay. Rock fragments are 0 to 15 percent gravel and 0 to 10 percent cobbles, and average 0 to 10 percent by volume.

Some pedons have organic surface horizons.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2 or 5/3; moist color is 10YR 3/1, 3/2 or 3/3. It is sandy loam, with 3 to 8 percent clay. Rock fragments are 0 to 5 percent gravel. Reaction is slightly acid.

The B horizon has dry color of 10YR 4/3, 5/3 or 6/3; moist color is 10YR 3/2, 3/3 or 4/3. It is sandy loam, with 5 to 16 percent clay. Rock fragments are 0 to 15 percent gravel and 0 to 10 percent cobbles, and average 0 to 10 percent by volume. Reaction is slightly acid to neutral.

ORECART FAMILY

The Orecart family consists of very deep, well drained soils forming in mixed alluvium influenced by volcanic ash. These soils are on old lake terraces, and have slopes of 1 to 5 percent. Elevation is 6,300 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Ashy, mesic Vitrandic Torripsamments

Typical Pedon: The representative profile for this soil is on a north-facing lake terrace, in an interdune position, under big sagebrush and rabbitbrush, at an elevation of 6,400 feet. Slope is 1 percent. When described (8/18/88), the soil was dry throughout. Colors are for dry soil unless otherwise noted.

A – 0 to 4 inches; white (10YR 8/1) loamy sand, brown (10YR 5/3) moist; strong very thick and thick platy structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine vesicular and interstitial pores; violently effervescent, disseminated lime; 1 percent tuffa and mixed gravel; strongly alkaline (pH 8.5); abrupt smooth boundary.

Bk – 4 to 11 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; violently effervescent, disseminated lime; 5 percent CaCO_3 nodules which slake in water; 1 percent tuffa gravel; strongly alkaline (pH 8.5); clear wavy boundary.

Bq – 11 to 25 inches; light brownish gray (2.5Y 6/2) loamy sand, brown (10YR 4/3) moist; massive; brittle, friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; violently effervescent, disseminated lime; 25 percent CaCO_3 -cemented hard and firm nodules, which slake in water; 1 percent tuffa gravel; strongly alkaline (pH 8.5); clear wavy boundary.

C1 – 25 to 40 inches; light gray (2.5Y 7/2) loamy sand, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; violently effervescent, disseminated lime; 10 percent CaCO_3 -cemented soft nodules, which slake in water; strongly alkaline (pH 8.5); gradual wavy boundary.

C2 – 40 to 50 inches; light gray (2.5Y 7/2) loamy sand, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; violently effervescent, disseminated lime; 10 percent CaCO_3 -cemented soft nodules, which slake in water; strongly alkaline (pH 8.5); clear smooth boundary.

C3 – 50 to 56 inches; light gray (2.5Y 7/2) loamy sand, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; violently effervescent, disseminated lime; 25 percent CaCO_3 -cemented hard and firm nodules, which slake in water; strongly alkaline (pH 8.5); clear smooth boundary.

2Bqb – 56 to 60 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; brittle, firm, nonsticky and nonplastic; common very fine and fine interstitial pores; violently effervescent, disseminated lime; strongly alkaline (pH 8.5).

Type Location: In Bodie-Coleville Soil Survey Area, about 1.25 miles north and 650 feet west of the southwest corner of Sec. 24, T.3N., R.26E., Bodie SE Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 62°F, and the mean winter soil temperature is about 40°F. The 10 to 40 inch textural control section is loamy sand, with 4 to 6 percent clay. Rock fragments are 0 to 1 percent tuffa and mixed gravel. The soil is violently effervescent, with disseminated lime, throughout. Reaction is strongly alkaline throughout.

The A horizon has dry color of 10YR 8/1; moist color is 10YR 5/3. It is loamy sand, with 4 percent clay. Rock fragments are 1 percent tuffa and mixed gravel by volume.

The Bk horizon has dry color of 10YR 6/3; moist color is 10YR 5/3. It is loamy sand, with 3 to 6 percent clay. Rock fragments are 0 to 1 percent tuffa gravel.

The Bq horizon has dry color of 2.5Y 6/2 or 7/2; moist color is 10YR 4/3 or 2.5Y 5/2. It is loamy sand or silt loam, with 4 to 6 percent clay. Rock fragments are 0

to 1 percent tuffa gravel by volume. Dry consistence is hard or brittle.

The C horizon has dry color of 2.5Y 7/2 or 10YR 6/3;

moist color is 2.5Y 5/2 or 10YR 4/3. It is loamy sand, with 4 to 6 percent clay. Rock fragments are 0 to 1 percent tuffa gravel.

PASS CANYON FAMILY

The Pass Canyon family consists of shallow, well drained soils forming in material weathering from granitic rocks. These soils are on mountainsides and hillsides, and have slopes of 15 to 90 percent. Elevation is 4,800 to 9,600 feet. The mean annual precipitation is about 5 to 25 inches, and the mean annual temperature is about 51°F.

Taxonomic Class: Loamy, mixed mesic Lithic Argixerolls

Typical Pedon: The representative profile for this soil is on a southwest-facing hillside, under pinyon pine, big sagebrush and antelope bitterbrush, at an elevation of 7,400 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; brown (10YR 5/3) very cobbly loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many medium interstitial pores; 10 percent gravel, 20 percent cobbles, 3 percent stones and 2 percent boulders; slightly acid (pH 6.2); clear smooth boundary.

A2 – 2 to 5 inches; brown (10YR 5/3) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine and fine tubular, and few medium interstitial pores; 15 percent gravel; slightly acid (pH 6.4); clear wavy boundary.

BE – 5 to 11 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine, fine and medium subangular blocky structure; hard, friable, slightly sticky and nonplastic; common very fine and few fine roots; few very fine and fine interstitial pores; 5 percent gravel; neutral (pH 6.7); clear smooth boundary.

Bt2 – 11 to 13 inches; grayish brown (10YR 5/2) sandy

loam, very dark grayish brown (10YR 3/2) moist; moderate fine and very fine subangular blocky structure; hard, friable, slightly sticky and nonplastic; few very fine, fine, medium and coarse roots; few very fine, fine and medium interstitial pores; few thin clay films on ped faces; 5 percent gravel; neutral (pH 6.8); abrupt smooth boundary.

R – 13 inches; hard granitic bedrock.

Type Location: About 165 feet west and 165 feet north of the southeast corner of the southwest quarter of the northwest quarter of Section 21, T.4S., R.31E., MDBM, Casa Diablo Mtn. SE Quadrangle.

Range in Characteristics: Depth to hard bedrock is 13 to 19 inches. The mean annual soil temperature at the lithic contact is about 53°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The textural control section is the whole argillic in pedons deeper than 14 inches, or the whole soil in pedons 14 inches or less deep. It is loamy sand or sandy loam, with 2 to 10 percent clay, and a weighted average of 6 to 10 percent clay. Rock fragments are 5 to 30 percent gravel, 0 to 20 percent cobbles, 0 to 3 percent stones and 0 to 2 percent boulders, and average 11 to 30 percent by volume.

Some pedons have surface organic layers.

The A horizon has dry color of 10YR 5/3; moist color is 10YR 3/1 or 3/2. It is loamy sand, with 2 to 7 percent clay. Rock fragments are 10 to 30 percent gravel, 0 to 20 percent cobbles, 0 to 10 percent stones and 0 to 2 percent boulders by volume. Reaction is slightly acid.

The B horizon has dry color of 10YR 5/2 or 5/3; moist color is 10YR 3/2 or 4/2. It is sandy loam, with 4 to 10 percent clay. Rock fragments are 0 to 30 percent gravel, 0 to 10 percent cobbles and 0 to 5 percent stones by volume. Reaction is neutral.

PIZONA FAMILY

The Pizona family consists of deep, well drained soils forming in basaltic rock, with some volcanic overburden. These soils are on mountainsides, and have slopes of 5 to 30 percent. Elevation is 5,000 to 6,600 feet. The mean annual precipitation is about 6 to 12 inches, and the mean annual temperature is about 50°F.

Taxonomic Class: Loamy-skeletal, mixed, mesic Xeric Haplargids

Typical Pedon: The representative profile for this soil is on a southeast-facing sideslope, under pinyon pine, big sagebrush and needle and thread grass, at an elevation of 6,200 feet. Slope is 41 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 3 inches; light brownish gray (10YR 6/2) cobbly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; 10 percent gravel, 10 percent cobbles and 3 percent stones; neutral (pH 6.6); abrupt irregular boundary.

A2 – 3 to 5 inches; light gray (10YR 7/2) cobbly loamy sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine vesicular pores; 5 percent gravel, 10 percent cobbles and 3 percent stones; neutral (pH 7.3); abrupt irregular boundary.

A3 – 5 to 11 inches; light gray (10YR 7/2) cobbly loamy sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 10 percent gravel, 10 percent cobbles and 1 percent stones; neutral (pH 7.3); clear wavy boundary.

2Ab – 11 to 17 inches; pale brown (10YR 6/3) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; 20 percent gravel, 10 percent cobbles and 1 percent stones; moderately alkaline (pH 7.5); clear wavy boundary.

2Btb1 – 17 to 24 inches; light yellowish brown (10YR 6/4) very cobbly sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine tubular and interstitial pores; few thin clay

films in pores and on peds; 25 percent gravel, 15 percent cobbles and 1 percent stones; moderately alkaline (pH 7.6); clear wavy boundary.

2Btb2 – 24 to 36 inches; light yellowish brown (10YR 6/4) very cobbly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine roots; few very fine tubular and interstitial pores; many thin and moderately thick clay films in pores and on ped faces; 25 percent gravel, 15 percent cobbles and 1 percent stones; moderately alkaline (pH 7.7); clear wavy boundary.

2Btqb – 36 to 44 inches; light yellowish brown (10YR 6/4) very cobbly sandy loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; few very fine tubular and interstitial pores; common thin clay films on peds and in pores; slight silica cementation; 25 percent gravel, 15 percent cobbles and 1 percent stones; moderately alkaline (pH 7.6); gradual wavy boundary.

2R – 44 inches; hard, fractured basaltic bedrock; average fracture spacing is 12 inches; some clay films coat the rock surfaces.

Type Location: In the Benton-Owens Valley Soil Survey Area, about 14 miles northwest of Benton, California and 4.5 miles west of Adobe Lake, about 800 feet southwest of dirt road on east-facing hillside and 50 feet northwest of large Pinyon tree; about 2,100 feet west and 2,500 feet north of the southeast corner of Section 1, T.1N., R.29E., MDBM, Glass Mountain Quadrangle.

Range of Characteristics: Soil depth to bedrock is 40 to 60 inches. The mean annual soil temperature at 20 inches is about 51°F, and the mean summer and mean winter soil temperatures differ by more than 9 °F. The textural control section is the whole argillic if less than 20 inches thick and the upper 20 inches if greater than 20 inches thick. The bulk density of the ashy overburden is 1.1 to 1.25 g/cc and the moist bulk density is 1.3 to 1.45 g/cc. It is 6 to 14 inches thick.

The A horizon has dry color of 10YR 6/2 or 7/2; moist color is 10YR 4/2, 5/2 or 5/3. It is cobbly loamy sand or very stony loamy sand. Rock fragments are 5 to

15 percent gravel, 5 to 15 percent cobbles and 3 to 40 percent stones, and average 15 to 50 percent by volume. The organic carbon content is about 0.1 to 0.3 percent.

The 2Ab horizon has dry color of 10YR 6/2 or 6/3; moist color is 10YR 4/2, 4/3 or 4/4. It is gravelly, cobbly or very cobbly sandy loam and loamy sand. Rock fragments are 10 to 20 percent gravel, 5 to 30 percent cobbles and 3 to 20 percent stones, and average 20 to 45 percent by volume.

The 2Btb horizon has dry color of 10YR 6/2, 6/3 or 6/4;

moist color is 10YR 4/2, 4/3 or 4/4. It is very cobbly or very stony sandy loam or sandy clay loam, with 15 to 30 percent clay. Rock fragments are 10 to 25 percent gravel, 15 to 25 percent cobbles and 1 to 20 percent stones by volume.

The 2Btqb horizon has dry color of 10YR 6/2, 6/3 or 6/4; moist color is 10YR 4/2, 4/3 or 4/4. It is very cobbly sandy loam or very cobbly sandy clay loam. Rock fragments are 10 to 25 percent gravel, 15 to 25 percent cobbles and 1 to 20 percent stones, and average 35 to 60 percent by volume.

POOLE FAMILY

The Poole family consists of very deep, very strongly alkaline, poorly drained soils forming in alluvium and lake sediments weathered from mixed rocks, and includes a high percentage of volcanic ash. These soils are on lake terraces, and have slopes of 0 to 2 percent. Elevation is 6,300 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Fine-silty, mixed (calcareous), mesic Typic Endoaquents

Typical Pedon: The representative profile for this soil is on a southeast-facing lake terrace, under saltgrass, sedges and greasewood, at an elevation of 6,440 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 3 inches; light gray (5Y 7/1) sandy loam, olive gray (5Y 4/2) moist; strong fine to medium platy structure; slightly hard, friable, slightly sticky and plastic; few very fine roots; common very fine irregular pores; strongly effervescent; very strongly alkaline (pH 9.6); abrupt wavy boundary.

A2 – 3 to 8 inches; gray (5Y 6/1) silty clay loam, olive gray (5Y 4/2) moist; strong very fine subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine, few medium and coarse roots; common very fine irregular and very fine tubular pores; strongly effervescent; very strongly alkaline (pH 9.6); clear wavy boundary.

A3 – 8 to 15 inches; gray (5Y 6/1) silty clay loam, olive gray (5Y 4/2) moist; strong fine to medium subangular blocky structure; hard, friable, sticky and plastic; common very fine and fine, few medium and coarse roots; common very fine irregular and fine

tubular pores; strongly effervescent; very strongly alkaline (pH 9.6); clear wavy boundary.

C1 – 15 to 60 inches; light gray (5Y 7/1) silty clay loam, gray (5Y 5/1) moist; strong medium prismatic structure; very hard, firm, sticky and plastic; few very fine roots; common very fine and fine tubular pores; strongly effervescent; very strongly alkaline (pH 9.6).

Type Location: The representative pedon is from the Bodie-Coleville survey, at SE/4 of NE/4 of Sec., 8, T.2N., R.28E., Mono County, Bodie SE Quadrangle.

Range in Characteristics: Soil depth ranges from 40 to greater than 60 inches. The mean annual soil temperature at a 20 inch depth is about 50°F. The soil is strongly calcareous and very strongly alkaline in reaction (pH 9.6). Hue is mostly 5Y but 2.5 Y in some pedons. The A1 horizon has value of 6 or 7 dry and 4 or 5 moist and chroma of 1 dry and 1 or 2 moist. The C horizon has value of 6 or 7 dry and 4 or 5 moist in most pedons but range to 2 moist in some pedons. Texture of the control section is silty clay loam or silt loam. Strata of sandy loam or loamy sand are present in the lower portion of some pedons. Rock fragments are 0 to 2 percent gravel and average 0 to 5 percent by volume.

The A horizon has color of 5Y 7/1 or 6/1 dry; and 5Y 5/2, 5/1, 4/2, 4/1, 2/2 or 2/1 moist. It is sandy loam or silty clay loam, with 5 to 30 percent clay. Rock fragments are 0 to 2 percent gravel and average 0 to 5 percent by volume.

The C horizon has color of 5Y 7/1 or 6/1 dry; and 5Y 5/2, 5/1, 4/2 or 4/1 moist. It is silty clay loam, with about 20 to 30 percent clay. Rock fragments are 0 to 2 percent and average 0 to 5 percent by volume.

POWMENT FAMILY

The Powment family consists of shallow, somewhat excessively drained soils forming in material weathering from adamellite. These soils are on mountainsides and mountain ridges, and have slopes of 30 to 90 percent. Elevation is 5,200 to 11,400 feet. The mean annual precipitation is about 6 to 30 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Sandy-skeletal, mixed, frigid, shallow Typic Xerorthents

Typical Pedon: The representative profile for this soil is on a northwest-facing hillside, under pinyon pine, mountain mahogany and Mormon tea, at an elevation of 8,000 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; grayish brown (10YR 5/2) very gravelly sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 40 percent gravel; neutral (pH 6.6); clear smooth boundary.

A2 – 2 to 6 inches; grayish brown (10YR 5/2) very gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine, and few medium roots; many very fine interstitial pores; 45 percent gravel; neutral (pH 6.6); clear wavy boundary.

A3 – 6 to 9 inches; brown (10YR 5/3) very gravelly sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine interstitial pores; 40 percent gravel and 5 percent cobbles; neutral (pH 6.7); clear wavy boundary.

C1 – 9 to 13 inches; pale brown (10YR 6/3) very gravelly loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and medium roots; many very fine interstitial pores; 40 percent gravel; neutral (pH 6.7) clear smooth boundary.

C2 – 13 to 15 inches; pale brown (10YR 6/3) extremely

gravelly coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and medium roots; many very fine interstitial pores; 60 percent gravel and 5 percent cobbles; neutral (pH 6.7); clear smooth boundary.

Cr – 15 inches; decomposing adamellite grus, which can be easily cut with a tilespade.

Type Location: About 165 feet west and 825 feet south of the northeast corner of Section 5, T.8S., R.32E., MDBM, Bishop SW Quadrangle.

Range in Characteristics: Soil depth is 7 to 15 inches to paralithic contact. The mean annual soil temperature at the lithic contact is about 44°F, and the mean summer temperature is about 61°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The textural control section is from the 10 inch depth to paralithic for pedons deeper than 14 inches, and is the whole soil for pedons less than 14 inches to the paralithic contact. It is loamy sand, loamy coarse sand or coarse sand, with 1 to 4 percent clay. Rock fragments are 20 to 60 percent gravel, 0 to 20 percent cobbles, 0 to 5 percent stones and 0 to 5 percent boulders, and average 40 to 50 percent by volume.

Some pedons have surface organic layers.

The surface A horizon has dry color of 10YR 5/2; moist color is 10YR 3/2 or 4/2. It is sand, with about 1 percent clay. Rock fragments are 25 to 40 percent gravel, 0 to 15 percent cobbles, 0 to 5 percent stones and 0 to 5 percent boulders by volume. Reaction is neutral.

The other A horizons have dry color of 10YR 5/2, 5/3 or 6/3; moist color is 10YR 3/2, 4/2 or 5/3. They are loamy sand, loamy coarse sand, sand or coarse sand, with 1 to 4 percent clay. Rock fragments are 20 to 45 percent gravel and 0 to 20 percent cobbles by volume. Reaction is neutral.

The C horizon has dry color of 10YR 6/3; moist color is 10YR 4/3 or 5/3. It is loamy sand, loamy coarse sand or coarse sand, with 1 to 4 percent clay. Rock fragments are 40 to 60 percent gravel and 0 to 20 percent cobbles by volume. Reaction is neutral.

PRESTON FAMILY

The Preston family consists of moderately deep to very deep, somewhat excessively drained soils forming in material weathering from granitic and mixed rocks. These soils are on mountainsides and hillsides, and have slopes of 30 to 60 percent. Elevation is 4,800 to 9,100 feet. The mean annual precipitation is about 5 to 20 inches, and the mean annual temperature is about 46°F.

Taxonomic Class: Mixed, mesic Typic Xeropsamments

Typical Pedon: The representative profile for this soil is on a north-facing hillside, under big sagebrush and bitterbrush, at an elevation of 7,100 feet. Slope is 50 percent. Colors are for dry soil unless otherwise noted.

Oi – 4 to 0 inches; decomposed and decomposing big sagebrush leaves and twigs; abrupt wavy boundary.

A – 0 to 2 inches; dark grayish brown (10YR 4/2) cobbly loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine and medium roots; many very fine interstitial pores; 10 percent gravel, 10 percent cobbles and 5 percent stones; neutral (pH 6.7); clear smooth boundary.

C1 – 2 to 9 inches; brown (10YR 5/3) loamy sand, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky grading to weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine interstitial and few fine tubular pores; 5 percent gravel and 5 percent cobbles; neutral (pH 6.7); clear wavy boundary.

C2 – 9 to 16 inches; pale brown (10YR 6/3) loamy sand, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few

very fine, common fine, medium and coarse roots; many very fine interstitial pores; 5 percent gravel; neutral (pH 6.7); gradual wavy boundary.

C3 – 16 to 60 inches; light brownish gray (10YR 6/2) loamy sand, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; 5 percent gravel; neutral (pH 6.6).

Type Location: About 100 feet west and 100 feet south of the southeast corner of the northwest quarter of the northwest quarter of Section 35, T.7S., R.31E., MDBM, Mt. Tom SE Quadrangle.

Range in Characteristics: Soil depth ranges from 30 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer temperature is about 69°F, and the mean winter soil temperature is about 36°F. The soil is usually dry from May to late November, and is usually moist in some parts the rest of the year. The 10 to 40 inch textural control section is sandy loam, loamy fine sand, loamy sand, loamy coarse sand, sand and coarse sand, with 1 to 6 percent clay. Rock fragments are 5 to 40 percent gravel, 0 to 10 percent cobbles and 0 to 5 percent stones, and average 10 to 40 percent by volume.

The A horizon has dry color of 10YR 6/2, 5/2 or 4/2; moist color is 10YR 3/2 or 3/3. It is sandy loam, loamy fine sand, loamy sand or sand, with 1 to 4 percent clay. Rock fragments are 0 to 40 percent gravel, 0 to 10 percent cobbles and 0 to 5 percent stones, and average 0 to 40 percent by volume. Reaction is neutral.

The C horizons have dry color of 10YR 6/2, 6/3 or 5/3; moist color is 10YR 5/3, 5/2, 4/3, 4/3, 3/3 or 3/2. It is loamy fine sand, loamy sand, sand or coarse sand, with 1 to 6 percent clay. Rock fragments are 0 to 30 percent gravels and 0 to 5 percent cobbles, and average 5 to 20 percent by volume. Reaction is neutral.

RAILCITY FAMILY

The Railcity family consists of deep to very deep, somewhat excessively drained soils forming in material weathering from rhyolite, andesite and granitic rocks. They are on mountainsides and moraine basins, on slopes of 2 to 90 percent. Elevation is 7,000 to 10,400 feet. The mean annual precipitation is about 10 to 35 inches, and the mean annual temperature is about 40°F.

Taxonomic Class: Sandy-skeletal, mixed, frigid Typic Xerorthents

Typical Pedon: The representative profile for this soil is on a southwest-facing mountainside, under Jeffrey pine and big sagebrush, at an elevation of 7,920 feet. Slope is 59 percent. When described (8/29/84), the soil was dry throughout. Colors are for dry soil unless otherwise noted.

Oe – 1 to 0 inch; decomposed and decomposing Jeffrey pine needles and twigs, and big sagebrush leaves; abrupt wavy boundary.

A1 – 0 to 3 inches; grayish brown (10YR 5/2) gravelly coarse sand, very dark gray (10YR 3/1) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine, and few fine roots; many very fine and fine interstitial pores; 16 percent gravel; strongly acid (pH 5.5); clear wavy boundary.

A2 – 3 to 14 inches; light brownish gray (10YR 6/2) extremely stony coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; many fine and medium interstitial pores; 10 percent gravel, 20 percent cobbles and 30 percent stones; slightly acid (pH 6.5); clear wavy boundary.

C1 – 14 to 27 inches; light brownish gray (10YR 6/2) very cobbly coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine, medium and coarse roots; many fine and medium interstitial pores; 25 percent gravel and 25 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

C2 – 27 to 60 inches; gray (10YR 5/1) very stony

coarse sand, black (10YR 2/1) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many fine and medium interstitial pores; 8 percent gravel, 5 percent cobbles and 25 percent stones; neutral (pH 7.0).

Type Location: About 1.35 miles east on the northern dirt road going to the mixing table in Smokey Bear Flat, from its intersection with Highway 395, the 0.6 mile south on dirt road, then 0.7 mile on southeast fork, and 175 feet upslope, on the east side of the road; about 175 feet east and 500 feet north of the southeast corner of the southwest quarter of the northeast quarter of Section 18, T.3S., R.28E., MDBM, Mt. Morrison NW Quadrangle.

Range in Characteristics: Soil depth to the lithic or paralithic contact is 42 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 40°F, and the mean summer soil temperature is about 57°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The 10 to 40 inch textural control section is loamy fine sand, loamy sand, loamy coarse sand, fine sand or coarse sand, with 2 to 10 percent clay. Rock fragments are 8 to 30 percent gravel, 0 to 45 percent cobbles, 0 to 30 percent stones and 0 to 19 percent boulders, and average 40 to 81 percent by volume.

Some pedons have A horizons with loamy coarse sand textures. Other pedons do not have a surface organic layer.

The A horizon has dry color of 10YR 5/2 or 6/2; moist color is 10YR 3/1 or 3/2. It is loamy sand, fine sand or coarse sand, with 2 to 10 percent clay. Rock fragments are 5 to 35 percent gravel, 0 to 20 percent cobbles, 0 to 30 percent stones and 0 to 10 percent boulders by volume. Reaction is very strongly to slightly acid.

The C horizon has dry color of 10YR 5/1, 6/1, 6/2, 6/3, 7/2, 7/3 or 7/4; moist color is 10YR 2/1, 3/2, 3/3, 4/2, 4/3, 4/4 or 5/3. It is loamy fine sand, loamy sand, loamy coarse sand, fine sand or coarse sand, with 2 to 10 percent clay. Rock fragments are 8 to 30 percent gravel, 0 to 45 percent cobbles, 0 to 25 percent stones and 0 to 19 percent boulders by volume. Reaction is moderately acid to neutral.

SALT CHUCK FAMILY

The Salt Chuck family consists of moderately deep to very deep, somewhat excessively drained soils forming in material weathering from granitic rocks. They are on moraines, mountainsides and hillsides, on slopes of 15 to 75 percent. Elevation is 7,200 to 12,300 feet. The mean annual precipitation is about 10 to 30 inches, and the mean annual temperature is about 39°F.

Taxonomic Class: Sandy-skeletal, mixed Entic Cryumbrepts

Typical Pedon: The representative profile for this soil is on a northwest-facing moraine sideslope, under lodgepole pine and western white pine, at an elevation of 10,100 feet. Slope is 58 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; dark grayish brown (10YR 4/2) extremely stony loamy sand, very dark gray (10YR 3/1) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many medium interstitial pores; 30 percent gravel, 20 percent cobbles, 35 percent stones and 10 percent boulders; moderately acid (pH 5.9); clear irregular boundary.

A2 – 2 to 7 inches; brown (10YR 5/3) extremely stony loamy sand, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure, parting to weak fine granular; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; many medium interstitial pores; 10 percent gravel, 20 percent cobbles and 45 percent stones; moderately acid (pH 6.0); clear irregular boundary.

A3 – 7 to 14 inches; brown (10YR 5/3) extremely stony loamy sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, and common fine, medium and coarse roots; many medium interstitial pores; 10 percent gravel, 20 percent cobbles and 45 percent stones; moderately acid (pH 6.0); clear wavy boundary.

C1 – 14 to 22 inches; light yellowish brown (2.5Y 6/4) very gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine

and fine roots; many medium interstitial pores; 35 percent gravel and 5 percent cobbles; slightly acid (pH 6.1); clear wavy boundary.

C2 – 22 to 33 inches; light gray (2.5Y 7/2) extremely stony loamy sand, olive (5Y 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; many medium interstitial pores; 45 percent gravel, 10 percent cobbles and 20 percent stones; slightly acid (pH 6.2); abrupt irregular boundary.

Cr – 33 inches; decomposing granitic bedrock, which can be cut with a tilespade.

Type Location: Just west of Serene Lake; about 1,000 feet west and 500 feet south of the northeast corner of the southwest quarter of the unaligned Section 12, T.6S., R.29E., MDBM, Mt. Tom NW Quadrangle.

Range in Characteristics: Soil depth to the lithic or paralithic contact is 30 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 41°F, and the mean summer soil temperature is about 53°F. The textural control section is from 10 inches to the lithic or paralithic contact in moderately deep pedons, and is the 10 to 40 inch section in deep pedons. It is sandy loam or loamy sand, with 2 to 8 percent clay. Rock fragments are 10 to 45 percent gravel, 5 to 20 percent cobbles, 0 to 45 percent stones and 0 to 20 percent boulders, and average 58 to 63 percent by volume.

Some pedons have a surface organic layer.

The A horizon has dry color of 10YR 4/2 or 5/3; moist color is 10YR 3/1, 3/2 or 3/3. It is sandy loam or loamy sand, with 1 to 9 percent clay. Rock fragments are 10 to 45 percent gravel, 10 to 20 percent cobbles, 5 to 45 percent stones, and 0 to 20 percent boulders by volume. Reaction is moderately acid to neutral.

The C horizon has dry color of 10YR 5/3, 5/4, 6/3 or 6/4, or 2.5Y 6/4 or 7/2; moist color is 10YR 3/3, 4/4 or 5/4, or 5Y 5/3. It is loamy sand, with 2 to 7 percent clay. Rock fragments are 20 to 45 percent gravel, 5 to 15 percent cobbles, 0 to 35 percent stones and 0 to 20 percent boulders by volume. Reaction is slightly acid to neutral.

SHERWIN FAMILY

The Sherwin family consists of shallow and very shallow, well drained soils forming from hard rhyolitic tuff. These soils are on volcanic flows and fans, and have slopes of 0 to 15 percent. Elevation is 5,700 to 7,600 feet. The mean annual precipitation is about 6 to 12 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Ashy, nonacid, mesic Lithic Xeric Torriorthents

Typical Pedon: The representative profile for this soil is a southeast-facing lava flow, under big sagebrush, desert needlegrass, spiny hopsage and Nevada ephedra, at an elevation of 5,400 feet. Slope is 6 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 3 inches; light gray (10YR 7/2) very cobbly loamy fine sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; 30 percent gravel (tuff fragments), 20 percent cobbles and 1 percent stones; neutral (pH 6.8); abrupt smooth boundary.

A2 – 3 to 7 inches; light gray (10YR 7/2) sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine vesicular pores; 5 percent gravel (tuff fragments), 5 percent cobbles and 1 percent stones; neutral (pH 6.8); abrupt wavy boundary.

R – 7 inches; pinkish white (7.5YR 8/2) hard rhyolitic tuff, light brown (7.5YR 6/4) moist. Fracture spacing averages 6 inches.

Type Location: In the Benton-Owens Valley Soil Survey Area, about 13 miles northwest of Bishop, California and 1 mile south of Mesa Camp, between two sharp secondary drainages; 1,100 feet west and 1,200 feet north of the southeast corner of Section 21, T.5S., R.31E., MDBM, Mount Tom Quadrangle.

Range in Characteristics: Depth to the hard tuff is 4 to 14 inches. The soil surface is covered with 35 to 65 percent rock fragments, made up of gravel (angular tuff fragments), cobbles and stones. The gravel and cobbles predominate. These soils contain 40 to 60 percent rhyolitic volcanic ash. Base saturation is 90 to 100 percent. The mean annual soil temperature at the lithic contact is about 55°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The textural control section is the whole soil, and is loamy fine sand or sandy loam, with an average of 6 to 10 percent clay. Rock fragments are 5 to 20 percent gravel, 15 to 30 percent cobbles and 0 to 3 percent stones, and average 20 to 35 percent by volume. The organic carbon is 0.3 to 0.6 percent. The soil is neutral or slightly alkaline throughout.

The A horizon has dry color of 10YR 6/3, 7/2, 7/3 or 8/2; moist color is 10YR 4/3, 4/4, 5/2, 5/3 or 6/2. The upper part (A1) is a very cobbly loamy fine sand, with 0 to 3 percent clay and contains 35 to 50 percent angular rock fragments, consisting of 10 to 30 percent gravel, 20 to 35 percent cobbles and 0 to 3 percent stones by volume. The lower part (A2) is sandy loam or gravelly sandy loam, and contains 11 to 20 percent angular tuff fragments, consisting of 5 to 15 percent gravel, 5 to 10 percent cobbles and 0 to 3 percent stones by volume.

SONOMA FAMILY

The Sonoma family consists of very deep, strongly alkaline soils forming in alluvium and lake sediments weathered from mixed rocks, which includes a high percentage of volcanic ash. These soils are on lake terraces, and have slopes of 0 to 2 percent. Elevation is 6,300 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Fine-silty, mixed (calcareous), mesic Aeric Fluvaquents

Typical Pedon: The representative profile for this soil is on a southeast-facing lake terrace, under saltgrass, reeds and greasewood, at an elevation of 6,460 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 4 inches; very pale brown (10YR 7/3) sand, grayish brown (2.5Y 5/2) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine and fine interstitial pores; 2 percent gravel; violently effervescent; strongly alkaline (pH 8.5+); clear smooth boundary.

A2 – 4 to 13 inches; light gray (10YR 7/2) sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 12 percent gravel; violently effervescent; strongly alkaline (pH 8.5+); clear smooth boundary.

2A – 13 to 22 inches; light gray (10YR 7/1) silt loam, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine interstitial pores; slightly effervescent; strongly alkaline (pH 8.5+); gradual smooth boundary.

2C1 – 22 to 46 inches; gray (5Y 6/1) silty clay loam, gray (5Y 5/1) moist; massive; soft, very friable, sticky and plastic; few fine and medium roots; common

very fine and few fine interstitial pores; strongly effervescent; strongly alkaline (pH 8.5+); abrupt smooth boundary.

2C2 – 46 to 52 inches; light yellowish brown (2.5Y 6/4) fine sand, olive brown (2.5Y 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few medium roots; many very fine and fine interstitial pores; slightly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.

2C3 – 52 to 60 inches; light gray (5Y 7/1) silty clay loam, gray (5Y 5/1) moist; massive; soft, very friable, sticky and plastic; common very fine and few fine interstitial pores; violently effervescent; moderately alkaline (pH 8.0).

Type Location: Near the southwest corner of the northeast quarter of the northwest quarter of Section 32, T.3N., R.27E., MDBM, Bodie SE Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean soil temperature at a 20 inch depth is about 50°F. The mean annual summer temperature is about 69°F, and the mean winter temperature is about 36°F. The soil is strongly calcareous and moderately to strongly alkaline in reaction. The textural control section is fine-silty, and it is fine sand, silt loam and silt clay loam, with 2 to 30 percent clay. Rock fragments are 0 to 12 percent gravel.

The A horizons have dry color of 10YR 7/3, 7/2, 7/1, 5Y 7/1 or 6/1; moist color is 10YR 5/3, 4/3, 3/3 or 2.5Y 5/2, 5/1, 4/2 or 4/1. It is sand, loamy sand, loam or silt loam, with 0 to 20 percent clay. Rock fragments are 0 to 12 percent gravel. Reaction is strongly alkaline.

The C horizons have dry color of 5Y 7/1 or 6/1; moist color is 5Y 5/2, 5/1, 4/2, 4/1 or 2.5Y 4/4. It is fine sand, silt loam or silt clay loam, with 0 to 30 percent clay. Rock fragments are 0 to 2 percent gravel. Reaction is moderately to strongly alkaline.

SPAINHOWER FAMILY

The Spainhower family consists of very deep, well drained soils forming in alluvium from mixed rocks. These soils are on fan terraces, and have slopes of 5 to 15 percent. Elevation is 4,400 to 6,000 feet. The mean annual precipitation is about 4 to 8 inches, and the mean annual temperature is about 55°F.

Taxonomic Class: Clayey-skeletal, mixed, thermic Xeric Haplargids

Typical Pedon: The representative profile for this soil is on a northeast-facing fan terrace, under spiny hopsage, Nevada ephedra and desert needlegrass, at an elevation of 3,900 feet. Slope is 7 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 5 inches; pale brown (10YR 6/3) cobbly sandy loam, dark brown (10YR 3/3) moist; moderate coarse subangular blocky structure, parting to moderate thick platy; slightly hard, friable, sticky and plastic; common very fine and few fine and medium roots; many very fine vesicular, and few very fine and fine tubular pores; 15 percent gravel, 5 percent cobbles and 2 percent stones; slightly alkaline (pH 7.6); clear smooth boundary.

BAt – 5 to 10 inches; light yellowish brown (10YR 6/4) gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate coarse subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine, and few medium roots; common very fine tubular pores; many thin clay films bridging mineral grains and on peds; 20 percent gravel, 8 percent cobbles and 2 percent stones; slightly alkaline (pH 7.6); clear smooth boundary.

Bt – 10 to 17 inches; light yellowish brown (10YR 6/4) very cobbly clay, dark yellowish brown (10YR 4/4) moist; moderate coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; common very fine and few fine tubular, and common very fine interstitial pores; many thin clay films bridging mineral sand grains, and common moderately thick clay films on peds and rock fragments; 25 percent gravel, 20 percent cobbles and 2 percent stones; slightly alkaline (pH 7.6); gradual smooth boundary.

Btk – 17 to 30 inches; light yellowish brown (10YR 6/4) extremely cobbly clay, dark yellowish brown

(10YR 4/4) moist; moderate coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; common very fine and few fine tubular pores; many thin clay films bridging mineral grains, and common moderately thick clay films on peds and rock fragments; slightly effervescent; 25 percent gravel, 35 percent cobbles and 5 percent stones; moderately alkaline (pH 8.0); gradual smooth boundary.

BCt – 30 to 42 inches; light yellowish brown (10YR 6/4) extremely cobbly sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine interstitial pores; many thin clay films bridging mineral grains, and few moderately thick clay films on peds and rock fragments; 30 percent gravel, 40 percent cobbles and 3 percent stones; neutral (pH 6.6); gradual smooth boundary.

C – 42 to 60 inches; light yellowish brown (10YR 6/4) extremely gravelly sandy loam, dark yellowish brown (10YR 4/6) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine and fine interstitial pores; common very thin clay films bridging mineral grains; 60 percent gravel, 20 percent cobbles and 5 percent stones; neutral (pH 6.8).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 4.5 miles northwest of Independence, California, and 150 feet west of Highway 395; about 350 feet east and 1,050 feet north of the southwest corner of Section 35, T.12S., R.34E., MDBM, Independence Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 62°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The textural control section is the whole argillic if less than 20 inches thick and the upper 20 inches of the argillic if greater than 20 inches thick. Reaction is slightly acid to moderately alkaline throughout. It is noneffervescent to slightly effervescent, with disseminated carbonates throughout.

The A horizon has dry color of 10YR 5/3 or 6/3; moist

color is 10YR 3/3, 4/3 or 4/4. It is cobbly sandy loam, with 10 to 20 percent clay. Rock fragments are 10 to 20 percent gravel, 8 to 20 percent cobbles and 0 to 10 percent stones, and average 25 to 35 percent by volume. Organic carbon is less than 0.5 percent.

The BA_t horizon has dry color of 7.5YR 5/4 or 6/4, or 10YR 6/4; moist color is 7.5YR 4/4, or 10YR 4/4. It is gravelly, cobbly, very gravelly or very cobbly sandy clay loam, loam or clay loam, with 20 to 35 percent clay. Rock fragments are 10 to 25 percent gravel, 8 to 25 percent cobbles and 0 to 15 percent stones.

The B_t and B_{tk} horizons have dry color of 7.5YR 5/4

or 6/4, or 10YR 6/4; moist color is 7.5YR 4/4, or 10YR 4/4. They are very cobbly or extremely cobbly clay loam or clay, with 35 to 45 percent clay. Rock fragments are 20 to 35 percent gravel, 20 to 35 percent cobbles and 2 to 20 percent stones, and average 40 to 70 percent by volume.

The BC_t and C horizons have dry color of 7.5YR 6/4, or 10YR 6/4; moist color is 7.5YR 4/4, or 10YR 4/4 or 4/6. They are extremely gravelly or extremely cobbly sandy loam, with 10 to 20 percent clay. Rock fragments are 20 to 60 percent gravel, 20 to 40 percent cobbles and 2 to 25 percent stones, and average 60 to 80 percent by volume.

SPRINGMEYER FAMILY

The Springmeyer family consists of moderately deep to very deep, well drained soils forming in volcanic tuff and mixed rocks. These soils are on mountainsides, and have slopes of 30 to 60 percent. Elevation is 6,800 to 7,200 feet. The mean annual precipitation is about 8 to 12 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Fine-loamy, mixed, mesic Aridic Argixerolls

Typical Pedon: The representative profile for this soil is on an east-facing mountainside, under Jeffrey pine, bitterbrush, big sagebrush, rabbitbrush and Great Basin wildrye, at an elevation of 7,280 feet. Slope is 47 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; grayish brown (10YR 5/2) sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; many very fine and fine interstitial pores; 10 percent gravel; neutral (pH 7.0); clear smooth boundary.

A2 – 2 to 7 inches; brown (10YR 5/3) gravelly sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; many very fine and fine interstitial pores; 20 percent gravel; slightly alkaline (pH 7.5); clear wavy boundary.

A3 – 7 to 13 inches; brown (10YR 5/3) gravelly sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; many very fine and fine interstitial pores; 25 percent gravel; 8 percent durinodes; neutral (pH 7.0); clear wavy boundary.

2Ab – 13 to 20 inches; brown (10YR 5/3) gravelly sandy loam, dark grayish brown (10YR 3/2) moist; massive; soft, very friable, slightly sticky and nonplastic; many very fine and few fine and medium roots; common very fine and fine interstitial pores; 22 percent gravel; slightly alkaline (pH 7.5); abrupt wavy boundary.

2Bt1 – 20 to 28 inches; brown (10YR 5/3) gravelly clay loam, dark grayish brown (10YR 4/2) moist;

massive; slightly hard, friable, slightly sticky and slightly plastic; common moderately thick colloid in bridges between mineral grains and common thin clay films line pores; few very fine, fine and coarse roots; common very fine and fine tubular pores; 32 percent gravel; slightly alkaline (pH 7.5); clear wavy boundary.

2BCtb – 28 to 32 inches; light brownish gray (2.5Y 6/2) clay loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, friable, sticky and plastic; many moderately thick colloid in bridges between mineral grains; few very fine and fine roots; few very fine and fine tubular pores; slightly alkaline (pH 7.5); abrupt wavy boundary.

2Cr – 32 to 60 inches; soft fractured tuff.

Type Location: About 100 feet northeast from the southwest corner of the southwest quarter of the southwest quarter of Section 17, T.2S., R.28E., MDBM, Cow-track Mtn SW Quadrangle.

Range in Characteristics: Soil depth ranges from 20 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The textural control section is the whole argillic if less than 20 inches thick and the upper 20 inches of the argillic if greater than 20 inches thick. It is sandy loam or clay loam, with 5 to 25 percent clay. Rock fragments are 0 to 35 percent gravel.

The A horizons have dry color of 10YR 5/2 or 5/3; moist color is 10YR 3/2 or 4/2. It is sand, loamy sand or sandy loam, with 0 to 8 percent clay. Rock fragments are 5 to 30 percent gravel. Reaction is neutral to slightly alkaline.

The Bt horizon has dry color of 10YR 5/2, 5/3, 2.5Y 6/2 or 6/3; moist color is 10YR 3/2, 2/2, 2.5Y 4/4 or 5/4. It is sandy loam or clay loam, with 18 to 30 percent clay. Rock fragments are 0 to 25 percent gravel. Reaction is slightly alkaline.

STACY FAMILY

The Stacy family consists of moderately deep to very deep, well to somewhat excessively drained soils forming from alluvium derived from mixed rocks. These soils are on alluvial fans and valley bottoms, and have slopes of 0 to 15 percent. Elevation is 6,500 to 8,000 feet. The mean annual precipitation is about 8 to 15 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Coarse-loamy, mixed, mesic, Aridic Duric Haploxerolls

Typical Pedon: The representative profile for this soil is on an southeast-facing alluvial fan, under sagebrush, rabbitbrush, bitterbrush, Great Basin wildrye and squirreltail, at an elevation of 7,500 feet. Slope is 5 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 1 inches; dark brown (10YR 4/3) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak thin platy & weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; few very fine roots; few medium interstitial pores; 5 percent gravel; slightly acid (pH 6.2); clear smooth boundary.

A2 – 1 to 6 inches; brown (10YR 5/3) loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure; soft, friable, nonsticky and nonplastic; few very fine and fine roots; few medium interstitial pores; slightly acid (pH 6.3); clear smooth boundary.

C1 – 6 to 12 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 3/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine and fine interstitial and tubular pores; slightly acid (pH 6.4); clear smooth boundary.

C2 – 12 to 20 inches; dark brown (10YR 4/3) sandy loam, dark brown (10YR 3/3) moist; moderate medium fine grading to moderate very fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and few

fine roots; few very fine interstitial pores; slightly acid (pH 6.4); clear wavy boundary; 10 percent durinodes.

C3 – 20 to 38 inches; dark brown (10YR 4/3) sandy loam, dark brown (10YR 3/3) moist; massive; hard, firm and hard, nonsticky and nonplastic; few very fine interstitial pores; slightly acid (pH 6.3); gradual smooth boundary; 15 percent durinodes.

C4 – 38 to 60 inches; yellowish brown (10YR 5/4) fine sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine interstitial pores; slightly acid (pH 6.4).

Type Location: About 100 feet northwest of the southeast corner of the northwest quarter of the southwest quarter of Section 7, T.3S., R.31E., MDBM, Casa Diablo Mtn NE Quadrangle.

Range in Characteristics: Soil depth to bedrock is 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean annual summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The 10 to 40 inch textural control section is loamy sand, sandy loam or fine sandy loam, with 2 to 12 percent clay. Rock fragments are 0 to 15 percent gravel. Depths between 20 to 38 inches may comprise a duric layer or a horizon cemented by illuvial silica.

The A horizons have dry color of 10YR 5/2, 5/3 or 4/3; moist color is 10YR 3/2. It is loamy sand, sandy loam or fine sandy loam, with 4 to 12 percent clay. Rock fragments are 0 to 15 percent gravel. Reaction is slightly acid.

The C horizons have dry color of 10YR 6/3, 5/4, 5/3 or 4/3; moist color is 10YR 3/3. It is loamy sand, sandy loam or fine sandy loam, with 2 to 12 percent clay. Rock fragments are 0 to 10 percent gravel. Reaction is slightly acid.

STECUM FAMILY

The Stecum family consists of moderately deep to very deep, somewhat excessively drained soils forming in materials weathering from granitic, metavolcanic, metasedimentary, glacial till and mixed rocks. It is on moraines, mountainsides and mountaintops, and glaciated terraces, on slopes of 2 to 80 percent. Elevation is 6,800 to 12,900 feet. The mean annual precipitation is about 8 to 30 inches, and the mean annual temperature is about 40°F.

Taxonomic Class: Sandy-skeletal, mixed Typic Cryorthents

Typical Pedon: The representative profile for this soil is on a north-facing mountainside, under hemlock and western white pine, at an elevation of 9,440 feet. Slope is 50 percent. When described (7/12/88), the soil was dry in the upper 9 inches, and slightly moist in the rest of the profile. Colors are for dry soil unless otherwise noted.

A – 0 to 9 inches; light gray (10YR 7/2) very cobbly loamy sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; common very fine and few medium roots; many very fine and fine interstitial pores; 9 percent gravel and 30 percent cobbles; strongly acid (pH 5.5); gradual smooth boundary.

2A – 9 to 24 inches; light brownish gray (10YR 6/2) very cobbly loamy sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 12 percent gravel, 25 percent cobbles and 5 percent boulders; strongly acid (pH 5.5); clear smooth boundary.

2C – 24 to 60 inches; light yellowish brown (10YR 6/4) very cobbly loamy coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 12 percent

gravel, 33 percent cobbles and 15 percent boulders; strongly acid (pH 5.5).

Type Location: About 220 feet west and 110 feet north of the southeast corner of the southwest quarter of the northwest quarter of Section 13, T.4S., R.27E., MDBM, Mt. Morrison SW Quadrangle.

Range in Characteristics: Depth to hard bedrock is 21 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 41°F, and the mean summer soil temperature is about 53°F. The textural control section is from 10 inches to the lithic contact in pedons shallower than 40 inches, and is the 10 to 40 inch section in pedons deeper than 40 inches. It is loamy fine sand, loamy sand, loamy coarse sand or coarse sand, with 1 to 16 percent clay. Rock fragments are 10 to 90 percent gravel, 0 to 37 percent cobbles, 0 to 50 percent stones and 0 to 25 percent boulders, and average 35 to 90 percent by volume.

Some pedons have a surface organic layer. Other pedons have buried B horizons.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, 5/3, 5/4, 6/2, 6/3, 6/4, 7/2 or 7/4; moist color is 10YR 3/1, 3/2, 3/3, 4/2, 4/3 or 5/3. It is loamy sand or loamy coarse sand, with 1 to 8 percent clay. Rock fragments are 9 to 60 percent gravel, 0 to 40 percent cobbles, 0 to 50 percent stones and 0 to 20 percent boulders by volume. Reaction is strongly acid to neutral.

The C horizon has dry color of 7.5YR 6/6 or 7/6, or 10YR 5/6, 6/3, 6/4, 7/2, 7/3, 7/4 or 8/2, or 2.5Y 6/2, 6/4 or 7/2; moist color is 7.5YR 5/6, or 10YR 3/3, 4/2, 4/3, 4/4, 5/3, 5/4, 5/6 or 8/2, or 2.5Y 4/2 or 4/4. It is loamy fine sand, loamy sand, loamy coarse sand or coarse sand, with 0 to 7 percent clay. Rock fragments are 10 to 90 percent gravel, 0 to 35 percent cobbles, 0 to 50 percent stones and 0 to 25 percent boulders by volume. Reaction is strongly acid to neutral.

SUMINE FAMILY

The Sumine family consists of very deep, well drained soils forming in material weathering from basalt rock. These soils are on mountainsides and mountain benches, and have slopes of 2 to 30 percent. Elevation is 7,600 to 9,400 feet. The mean annual precipitation is about 12 to 25 inches, and the mean annual soil temperature is about 47 °F.

Taxonomic Class: Loamy-skeletal, mixed frigid Aridic Argixerolls.

Typical Pedon: The representative profile for this soil is on a southwest-facing mountain bench, under big sagebrush, antelope bitterbrush and Jeffrey pine, at an elevation of 8,080 feet. Colors are for dry soil unless otherwise noted.

Oe – 1/4 to 0 inch; fresh and decomposing shrub parts; abrupt smooth boundary.

A1 – 0 to 2 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many fine interstitial pores; 20 percent gravel; moderately acid (pH 5.7); abrupt smooth boundary.

A2 – 2 to 13 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 15 percent gravel; slightly acid (pH 6.2); clear wavy boundary.

A3 – 13 to 27 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine and medium roots; common very fine interstitial pores; 15 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

2Bwb – 27 to 38 inches; brown (10YR 5/3) very gravelly sandy loam, brown (10YR 4/3) moist; moder-

ate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common medium and coarse roots; common very fine interstitial pores; 30 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

2Btb – 38 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; massive; hard, friable, nonsticky and nonplastic; few coarse roots; few very fine interstitial pores; few thin clay films bridging mineral sand grains; 35 percent gravel and 15 percent cobbles; neutral (pH 6.7).

Type Location: About 1,485 feet east and 660 feet north of the southwest corner of Section 10, T.2S., R.28E., MDBM, Cowtrack Mountain SW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 53°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The textural control section is the upper 20 inches of the argillic horizon. It is sandy loam or loam, with 6 to 12 percent clay. Rock fragments are 25 to 35 percent gravel, 0 to 15 percent cobbles and 0 to 5 percent stones, and average 35 to 65 percent by volume.

Some pedons do not have organic surface layers.

The A horizon has dry color of 10YR 4/3, 5/2 or 5/3; moist color is 10YR 3/2. It is loamy sand or loamy coarse sand, with 1 to 2 percent clay. Rock fragments are 5 to 25 percent gravel by volume. Reaction is moderately acid to neutral.

The B horizon has dry color of 10YR 3/3, 4/3, 5/3 or 6/3, or 5YR 4/4; moist color is 10YR 4/3, or 7.5YR 3/2, or 5YR 3/4. It is loam, fine sandy loam or sandy loam, with 4 to 12 percent clay. Rock fragments are 5 to 35 percent gravel, 5 to 35 percent cobbles and 0 to 5 percent stones by volume. Reaction is slightly acid to neutral.

SUR FAMILY

The Sur family consists of moderately deep to very deep, well drained soils forming in material weathering from granitic till, adamellite or basalt. These soils are on hillsides and moraines, and have slopes of 15 to 60 percent. Elevation is 4,400 to 8,600 feet. The mean annual precipitation is about 4 to 17 inches, and the mean annual temperature is about 51°F.

Taxonomic Class: Loamy-skeletal, mixed, mesic Entic Haploxerolls

Typical Pedon: The representative profile for this soil is on a south-facing glacial moraine, under big sagebrush and antelope bitterbrush, at an elevation of 5,600 feet. Color are for dry soil unless otherwise noted.

A1 – 0 to 1 inch; brown (10YR 5/3) sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; neutral (pH 6.7); clear wavy boundary.

A2 – 1 to 5 inches; brown (10YR 5/3) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky, parting to weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine and few fine and medium vesicular pores; 15 percent gravel, 3 percent stones and 2 percent boulders; neutral (pH 6.7); clear wavy boundary.

A3 – 5 to 12 inches; brown (10YR 5/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky, parting to moderate very fine and fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine tubular pores; 15 percent gravel, 15 percent cobbles, 3 percent stones and 2 percent boulders; neutral (pH 6.6); clear irregular boundary.

C1 – 12 to 34 inches; pale brown (10YR 6/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; massive; very hard, friable, slightly sticky and nonplastic; few very fine roots; many very fine and fine interstitial pores; 35 percent gravel, 15 percent cobbles, 3

percent stones and 2 percent boulders; neutral (pH 6.7); gradual smooth boundary.

C2 – 34 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard; friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 40 percent gravel, 10 percent cobbles, 7 percent stones and 3 percent boulders; neutral (pH 6.7).

Type Location: About 660 feet north and 500 feet west of the southwest corner of the southeast quarter of the southwest quarter of the irregular Section 26, T.9S., R.33E., MDBM, Big Pine NE Quadrangle.

Range in Characteristics: Soil depth is 31 to greater than 60 inches to lithic contact. The mollic epipedon is 10 to 12 inches thick. The mean annual soil temperature at 20 inches is about 53°F. The mean summer temperature is about 69°F, and the mean winter temperature is about 36°F. The textural control section is the 10 inch to lithic contact portion in pedons less than 40 inches to bedrock, and is the 10 to 40 inch section in soils greater than 40 inches to bedrock. It is sandy loam or coarse sandy loam, with 3 to 17 percent clay. Rock fragments are 12 to 50 percent gravel, 0 to 65 percent cobbles, 0 to 7 percent stones and 0 to 3 percent boulders, and average 42 to 68 percent by volume.

Some pedons have organic surface horizons.

The A horizon has dry color of 10YR 5/3 or 5/4; moist color is 10YR 3/2 or 3/3. It is sandy loam, loamy sand or sand, with 1 to 10 percent clay. Rock fragments are 0 to 50 percent gravel, 0 to 25 percent cobbles, 0 to 3 percent stones and 0 to 2 percent boulders by volume. Reaction is neutral.

The C horizon has dry color of 10YR 5/3, 5/4 or 6/3, or 2.5Y 5/4; moist color is 10YR 3/2, 3/3, 4/3 or 4/4, or 2.5Y 4/2. It is sandy loam or coarse sandy loam, with 3 to 17 percent clay. Rock fragments are 12 to 50 percent gravel, 0 to 65 percent cobbles, 0 to 7 percent stones and 0 to 3 percent boulders by volume. Reaction is neutral.

TABOOSE FAMILY

The Taboose family consists of very deep, well drained soils forming in material weathered from basalt lava containing many cinders. These soils are on recent basalt lava flows, and have slopes of 5 to 30 percent. Elevation is 4,000 to 4,800 feet. The mean annual precipitation is about 4 to 8 inches, and the mean annual temperature is about 55°F.

Taxonomic Class: Ashy-skeletal, thermic Vitrandic Torriorthents

Typical Pedon: The representative profile for this soil is on an east-facing lava flow, under Nevada ephedra, fremont dalea, spiny hopsage and desert needlegrass, at an elevation of 4,200 feet. Slope is 8 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 5 inches; brown (10YR 5/3) very gravelly loamy fine sand, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, non-sticky and nonplastic; few very fine roots; common very fine interstitial and vesicular pores; 35 percent gravel (cinders), 15 percent cobbles and 1 percent stones; neutral (pH 7.3); clear wavy boundary.

C – 5 to 25 inches; pale brown (10YR 6/3) gravelly fine sandy loam; dark brown (10YR 3/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine, and common medium roots; common very fine interstitial and tubular pores; 20 percent gravel (cinders), 5 percent cobbles and 1 percent stones; moderately alkaline (pH 7.5); gradual wavy boundary.

2C – 25 to 60 inches; yellowish brown (10YR 5/4) extremely stony loamy fine sand, dark brown (10YR

3/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, and few fine and medium roots; many very fine interstitial pores; 40 percent gravel (cinders), 10 percent cobbles and 20 percent stones; silica coatings on the undersides of cinders; moderately alkaline (pH 7.5).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 4.75 miles south of Big Pine, California, on Crater Mountain lava flow; about 100 feet west and 1,500 feet north of the southwest corner of Section 9, T.10S., R.34E., MDBM, Big Pine Quadrangle.

Range in Characteristics: Soil depth to hard lava is 60 inches or more. The mean annual soil temperature at 20 inches is about 59°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The 10 to 40 inch textural section is gravelly fine sandy loam to extremely stony loamy fine sand. Rock fragments average 35 to 80 percent cinders by volume. The soil is neutral to moderately alkaline throughout.

The A horizon has dry color of 10YR 5/3 or 6/3; moist color is 10YR 3/3 or 4/3. It is very gravelly loamy fine sand or very gravelly fine sandy loam. Rock fragments are 20 to 60 percent gravel, 5 to 20 percent cobbles and 1 to 3 percent stones, and average 35 to 75 percent by volume. The organic carbon content is 0.3 to 0.5 percent.

The C horizon has dry color of 10YR 4/1, 4/3, 5/3, 5/4 or 6/3; moist color is 10YR 3/3, 3/4 or 4/3. It is extremely stony loamy fine sand or very stony loamy fine sand. Rock fragments are 40 to 60 percent gravel, 5 to 30 percent cobbles and 15 to 25 percent stones, and average 35 to 80 percent by volume.

TINEMAHA FAMILY

The Tinemaha family consists of very deep, well drained soils forming in granitic alluvium. These soils are on alluvial fans and fan terraces, and have slopes of 5 to 15 percent. Elevation is 4,400 to 6,000 feet. The mean annual precipitation is about 4 to 8 inches, and the mean annual temperature is about 55 to 58°F.

Taxonomic Class: Loamy-skeletal, mixed thermic Xeric Haplargids

Typical Pedon: The representative profile for this soil is on an east-facing fan terrace, under spiny hopsage, Nevada ephedra and desert needlegrass, at an elevation of 4,300 feet. Slope is 8 percent. Colors are for dry soil unless otherwise noted.

- A1 – 0 to 1 inch; pale brown (10YR 6/3) gravelly loamy coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 10 percent gravel, 3 percent cobbles, 2 percent stones and 1 percent boulders; neutral (pH 7.0); abrupt smooth boundary.
- A2 – 1 to 9 inches; pale brown (10YR 6/3) gravelly loamy coarse sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 10 percent fine gravel, 3 percent cobbles, 2 percent stones and 1 percent boulders; neutral (pH 7.2); clear wavy boundary.
- Bt1 – 9 to 15 inches; brown (10YR 5/3) very cobbly sandy clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; common very fine interstitial, and few very fine tubular pores; few thin clay films in pores and bridging mineral grains; 10 percent fine pebbles; neutral (pH 7.2); clear wavy boundary.
- Bt2 – 15 to 27 inches; yellowish brown (10YR 5/4) very cobbly sandy clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; common very fine interstitial, and few very fine tubular pores; common thin clay films on ped faces, in pores and bridging mineral grains; 10 percent fine gravel, 30 percent cobbles and 10

percent stones; neutral (pH 7.2); gradual wavy boundary.

- C – 27 to 60 inches; pale brown (10YR 6/3) very stony loamy coarse sand, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 10 percent fine gravel, 20 percent cobbles and 20 percent stones; neutral (pH 7.2).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 6 miles south of Big Pine, California and 1 mile west of Fish Springs, in the Owens Valley, 25 yards northwest of the powerline on the west side of the powerline road; 75 feet west and 1,300 feet north of the southeast corner of Section 17, T.10S., R.34E., MDBM, Big Pine Quadrangle.

Range in Characteristics: Soil depth is 60 inches or greater. Solum depth is 19 to 30 inches. The mean annual soil temperature at 20 inches is about 62°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The textural control section is the whole argillic if less than 20 inches thick and the upper 20 inches if greater than 20 inches thick. Base saturation is 90 to 100 percent throughout the profile. The soil is neutral to slightly alkaline throughout.

The A horizon has dry color of 10YR 5/3, 6/3, 6/4 or 7/3; moist color is 10YR 3/3, 4/3, 4/4 or 5/3. It is loamy sand, gravelly loamy sand or gravelly loamy coarse sand, with 3 to 10 percent clay. Rock fragments are 10 to 30 percent gravel, 1 to 10 percent cobbles and 3 to 10 percent stones and boulders, and average 15 to 35 percent by volume. The organic carbon content is 0.2 to 0.4 percent.

The Bt horizon has dry color of 10YR 5/3, 5/4, 6/3, 6/4, 7/2, or 7/3, or 7.5YR 5/6, 6/4 or 6/6; moist color is 10YR 3/3, 4/2, 4/3, 4/4 or 5/4, or 7.5YR 4/4 or 4/6. It is sandy loam or sandy clay loam, with very stony, very cobbly or extremely stony modifiers. Clay content is 12 to 30 percent, but averages 20 to 30 percent in the upper 20 inches of the horizon. Faint and distinct mottles with olive and reddish yellow hues (5Y 4/4 or 7.5Y 6/6), are present in some profiles. Rock fragments are 10 to 30 percent gravel, 10 to 30 percent cobbles and 5 to 40 percent stones, and average 35 to 80 percent by volume.

The C horizon has dry color of 10YR 6/3, 7/2 or 7/3, or 7.5YR 6/6; moist color is 10YR 4/3, 5/3 or 5/4, or 7.5YR 4/6. It is loamy coarse sand, with very stony or

extremely stony modifiers. Rock fragments are 10 to 30 percent gravel, 15 to 30 percent cobbles and 30 to 50 percent stones, and average 35 to 80 percent by volume.

TOQUERVILLE FAMILY

The Toquerville family consists of shallow and very shallow, somewhat excessively drained soils forming in residuum from granitic bedrock. These soils are on hillsides, and have slopes of 5 to 60 percent. Elevation is 4,000 to 6,800 feet. The mean annual precipitation is about 4 to 8 inches, and the mean annual temperature is about 55°F.

Taxonomic Class: Mixed, thermic Lithic Torripsamments

Typical Pedon: The representative profile for this soil is on a northeast-facing hillside, under blackbrush, Nevada ephedra, California buckwheat and desert needlegrass, at an elevation of 5,400 feet. Slope is 40 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 5 inches; light brownish gray (10YR 6/2) cobbly sand, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and few medium roots; many very fine interstitial pores; 15 percent gravel and 15 percent cobbles; slightly alkaline (pH 7.5); abrupt wavy boundary.

R – 5 inches; hard granodiorite bedrock.

Type Location: In the Benton-Owens Valley Soil Survey Area, about 5 miles west of Bishop, California, and 1/4 mile south of house, near hilltop; about 600 feet east and 400 feet south of the NW1/4 of the NE1/4 of Section 7, T.7S., R.32E., MDBM, Mount Tom Quadrangle.

Range in Characteristics: Depth to the lithic contact is 3 to 20 inches. The mean annual soil temperature at the lithic contact or 20 inches is about 60°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The textural control section is the whole soil for soils less than 14 inches deep, or is the section from the 10 inch depth to the lithic contact for those soils deeper than 14 inches.

The A horizon has dry color of 10YR 6/2 or 6/3; moist color is 10YR 4/2 or 4/3. It is bouldery, stony, cobbly or gravelly loamy coarse sand or sand. Rock fragments are 5 to 25 percent gravel, 0 to 15 percent cobbles, 0 to 10 percent stones and 0 to 5 percent boulders, and average 10 to 35 percent by volume. Structure is weak subangular blocky, massive or single grain. Base saturation is 90 to 100 percent. The soil reaction is neutral or slightly alkaline. The organic carbon content is 0.2 to 0.4 percent.

TORRIORTHENTIC HAPLOXEROLLS

These Torriorthentic Haploxerolls consist of very deep, somewhat excessively drained soils forming in material weathering from mixed and basalt rocks. These soils are on alluvial fans, glacial moraines, terraces, mountainsides, hillsides and hilltops, on slopes of 0 to 60 percent. Elevation is 4,600 to 8,800 feet. The mean annual precipitation is about 4 to 20 inches, and the mean annual air temperature is about 48°F.

Taxonomic Class: Torriorthentic Haploxerolls

Typical Pedon: The representative profile for this soil is on an east-facing mountainside, under big sagebrush and Indian ricegrass, at an elevation of 7,680 feet. Slope is 39 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 3 inches; brown (10YR 5/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 27 percent gravel; slightly acid (pH 6.5); abrupt irregular boundary.

2A1 – 3 to 5 inches; brown (10YR 4/3) gravelly sandy loam, very dark brown (10YR 2/2) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 20 percent gravel; neutral (pH 6.7); clear irregular boundary.

2A2 – 5 to 16 inches; brown 10YR 4/3) gravelly sandy loam, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine, medium and coarse roots, many very fine and fine interstitial pores; 27 percent gravel; neutral (pH 7.0); clear wavy boundary.

2A3 – 16 to 20 inches; brown (10YR 4/3) gravelly sandy loam, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; many very fine and fine interstitial pores; 25 percent gravel; neutral (pH 7.0); clear wavy boundary.

2B1q – 20 to 43 inches; yellowish brown (10YR 5/4) very cobbly sandy loam, dark brown (10YR 3/3) moist; massive; very hard, firm, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; few

very fine tubular pores; 25 percent gravel; neutral; (pH 7.0); gradual wavy boundary.

2B2q – 43 to 60 inches; yellowish brown (10YR 5/4) very cobbly sandy loam, brown (10YR 4/3) moist; massive; hard, firm, nonsticky and nonplastic; few fine, medium and coarse roots; few very fine and fine tubular pores; 25 percent gravel; neutral (pH 7.0).

Type Location: About 1 mile west on McGee Creek Road (Forest Service Road 4S06), then 3/4 mile west on trail, on west shoulder of road; about 165 feet east and 1,150 feet north of the southwest corner of Section 28, T.4S., R.29E., MDBM, Mt. Morrison Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The soil moisture control section is 4 to 30 inches. It is usually dry from May to October, and is usually moist in some part the rest of the year. The 10 to 40 inch textural control section is sandy clay loam, sandy loam, coarse sandy loam, loamy sand, and loamy coarse sand with 2 to 20 percent clay. Rock fragments are 20 to 70 percent gravel, 0 to 40 percent cobbles, and 0 to 30 percent stones, and average 41 to 66 percent by volume.

Some pedons have surface layers with coarse sandy loam textures. Other pedons have organic surface layers 1/4 inch or less thick.

The surface A horizon has dry color of 10R 4/2, 5/2, or 5/3; moist color is 10YR 3/1, 3/2 or 4/2. It is sandy loam, loamy sand or loamy coarse sand, with 1 to 6 percent clay. Rock fragments are 10 to 35 percent gravel, 0 to 20 percent cobbles, and 0 to 5 percent stones by volume. Reaction is moderately acid to slightly alkaline.

The other A horizons have dry color of 2.5Y 5/2 or 5/4, or 10YR 4/2, 4/3, 4/4, 5/2 or 5/3; moist color is 2.5Y 3/2, or 10YR 2/2, 3/2 or 3/3, or 7.5YR 3/2. They are sandy clay loam, sandy loam, coarse sandy loam, loamy sand or loamy coarse sand, with 2 to 20 percent clay. Rock fragments are 20 to 70 percent gravel, 0 to 40 percent cobbles, and 0 to 30 percent stones. Reaction is slightly acid to neutral.

The Bq horizon has dry color of 10YR 4/4, 5/3 or 5/4; moist color is 10YR 3/3 or 4/3. It is sandy loam or loamy coarse sand, with 2 to 10 percent clay. Rock fragments

are 25 to 40 percent gravel, 0 to 35 percent cobbles, and 0 to 50 percent stones. Reaction is neutral.

TYPIC FLUVAQUENTS

These Typic Fluvaquents consist of very deep, poorly drained soils forming in drainage bottoms from alluvium weathered from mixed rocks, and have slopes of 0 to 9 percent. Elevation is 6,300 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Typic Fluvaquents

Typical Pedon: The representative profile for this soil is on a southeast-facing relict shoreline, under grasses and sedges and scattered sagebrush, at an elevation of 6,470 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, friable, nonsticky and nonplastic; many very fine, fine and medium roots; high organic matter content; moderately alkaline (pH 8.2); abrupt smooth boundary.

A2 – 2 to 5 inches; light grayish brown (10YR 6/2) gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; many very fine, fine and medium roots; moderately alkaline (pH 8.2); abrupt smooth boundary.

A3 – 5 to 10 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; many very fine, fine and medium roots; high organic matter content; moderately alkaline (pH 8.2 to 8.4); abrupt smooth boundary.

2C1 – 10 to 12 inches; light gray (10YR 6/1) loamy sand, dark gray (10YR 4/1) moist; massive; loose, nonsticky and nonplastic; common very fine and fine roots; slightly effervescent; moderately alkaline (pH 8.2); gradual smooth boundary.

3C2 – 12 to 18 inches; dark gray (10YR 4/1) and reddish pink (5YR 7/6) sandy loam, light gray (10YR 6/1) and reddish yellow (5YR 6/6) moist; massive; slightly hard, very friable, nonsticky and slightly plastic; many very fine and fine roots; slightly effervescent; moderately alkaline (pH 8.2); gradual smooth boundary.

4C3 – 18 to 32 inches; light brownish gray (10YR 6/2) and dark gray (10YR 4/1) loam with organic

stains and many distinct white (10YR 8/1) and light gray (10YR 7/1) mottles, and dark grayish brown (10YR 4/2) and very dark gray (10YR 3/1) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; slightly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.

4C4 – 32 to 42 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; slightly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.

5C5 – 42 to 44 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; massive; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; slightly effervescent; moderately alkaline (pH 8.3); abrupt smooth boundary.

6C6 – 44 to 60 inches; grayish brown (10YR 5/2) silty clay loam with many medium distinct white (10YR 8/1) mottles, very dark grayish brown (10YR 3/2) moist with light gray (10YR 7/1) mottles; massive; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; slightly effervescent; moderately alkaline (pH 8.3).

Type Location: About 0.5 miles east of Dechambeau Ranch, 1,900 feet east from shoulder of dirt road; at 2.2 miles south of the southeast corner of Sec. 27, T.2N., R.26E., MDBM, Bodie SE Quadrangle.

Range in Characteristics: Soil depth is usually 60 inches or more. The mean annual soil temperature at 20 inches is about 44°F. The mean annual summer and winter soil temperature differ by more than 9°F. The particle-size class of the control section is fine-loamy, ranging in texture from sandy loam to silt loam, with 18 to 35 percent clay. Rock fragments are gravel, and range from 0 to 25 percent and average 0 to 30 percent by volume.

The A horizons have dry color of 10YR 6/1, 6/2, 5/1 or 5/2; moist color is 10YR 4/1, 4/2, 3/1 or 3/2. Texture is loam and gravelly loamy sand, with 2 to 20 percent clay. Gravel rock fragments range from 0 to 25 percent, and average 0 to 30 percent by volume.

The C horizons have dry color of 10YR 6/1, 6/2, 5/1, 5/2 or 5YR 7/6; moist color is 10YR 5/2, 4/1, 4/2, 3/2, or 5YR 6/6. The C horizons are stratified with three or more lithologic discontinuities or contrasting horizons.

Mottles color are 10YR 8/1 dry, and 7/1 moist. Textures are silty clay loam, loam and loamy sand, with 3 to 35 percent clay. Gravel-size rock fragments average 0 to 15 percent by weight, and 0 to 18 percent by volume.

VITRANDIC CRYOPSAMMENTS

These Vitrandic Cryopsamments consist of deep to very deep, somewhat excessively drained soils forming in pumice, mixed with minor amounts of obsidian, andesitic and granitic rocks. These soils are on mountainsides, hillsides and mountain basins, and have slopes of 0 to 60 percent. Elevation is 7,500 to 10,200 feet. The mean annual precipitation is about 10 to 30 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Vitrandic Cryopsamments

Typical Pedon: The representative profile for this soil is on a west-by-southwest-facing mountainside under lodgepole pine and bunchgrasses, at an elevation of 8,880 feet. Slope is 13 percent. When described (8/28/86), the soil was dry in the upper 32 inches and slightly moist in the lower 28 inches. Color is for dry soil unless otherwise noted.

A1 – 0 to 3 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft; very friable, nonsticky and nonplastic; common very fine, fine and medium roots; many very fine and fine interstitial pores; 12 percent pumice and obsidian gravel; strongly acid (pH 5.5); clear smooth boundary.

A2 – 3 to 11 inches; light brownish gray (10YR 6/2) gravelly coarse sand, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 18 percent pumice and obsidian gravel; neutral (pH 7.0); clear smooth boundary.

C – 11 to 21 inches; light gray (10YR 7/2) gravelly coarse sand, variegated gray and light gray (10YR 5/1 and 7/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine, medium and coarse roots; many very fine and fine interstitial pores; 20 percent pumice and obsidian gravel; neutral (pH 7.0); abrupt smooth boundary.

2Ab – 21 to 32 inches; light brownish gray (10YR 6/2) gravelly coarse sand, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few medium, and common coarse and very coarse roots; many fine and

fine interstitial pores; 15 percent pumice, obsidian and granitic gravel; slightly acid (pH 6.5); gradual smooth boundary.

3C1 – 32 to 39 inches; pale brown (10YR 6/3) gravelly loamy sand, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; 25 percent pumice, obsidian and granitic gravel; slightly acid (pH 6.5); gradual smooth boundary.

3C2 – 39 to 60 inches; light brown (7.5YR 6/4) sand, brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; 13 percent granitic and rhyolitic gravel; slightly acid (pH 6.5)

Type Location: About 210 feet east of the intersection of Forest Service roads 1S35 and 1S56; about 1,300 feet east and 660 feet south of the northwest corner of Sec. 25, T.1S., R.28E., MDBM, Cowtrack Mountain SE Quadrangle.

Range in Characteristics: Soil depth to volcanic bedrock is 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 35°F, and the mean annual summer soil temperature is about 43°F. The 10 to 40 inch textural control section is loamy sand, loamy coarse sand, sand or coarse sand, with 0 to 7 percent clay. Rock fragments are 5 to 30 percent gravel, mostly pumice, with minor amounts of obsidian and granitics, and averages 5 to 25 percent by volume.

Some pedons have loamy fine sand, sand and very coarse sand surface layers. Other pedons do not have an organic layer. A few pedons are underlain by glacial till at depths of 40 inches or greater.

The A horizon has dry color of 10YR 5/1, 5/2, 6/1, 6/2, 6/3 or 7/2; moist color is 10YR 3/1, 3/2, 4/1, 4/2, 4/3, 5/2 or 5/3. It is loamy sand, loamy coarse sand or coarse sand, with 1 to 4 percent clay. Rock fragments are 1 to 55 percent gravel by volume, mostly pumice, with minor amounts of obsidian, andesitic and granitic gravel. Reaction is strongly acid to neutral.

The C horizon has dry color of N7/0; or 10YR 5/1, 5/4, 6/2, 6/3, 7/2, 7/3, 8/2 or 8/3, or 7.5 YR 5/4 or 6/4; moist color is 10YR 3/3, 4/2, 4/3, 4/4, 5/1, 5/2, 5/3, 6/2, 6/3, 7/2 or 8/1, or 7.5YR 4/4. It is loamy fine sand, loamy sand, loamy coarse sand, sand or coarse

sand, with 0 to 7 percent clay. Rock fragments are 3 to 32 percent gravel by volume, mostly pumice, with minor amounts of obsidian and granitic gravel. Reaction is strongly acid to neutral.

VITRANDIC CRYORTHENTS

These Vitrandic Cryorthents consist of moderately deep to very deep, somewhat excessively drained soils forming in material weathering from pumice, rhyolite, granite and obsidian. These soils are on hillsides, terraces, mountainsides, mountain benches, mountain flats, and have slopes of 0 to 60 percent. Elevation is 6,800 to 9,900 feet. The mean annual precipitation is about 10 to 45 inches, and the mean annual temperature is about 38°F.

Due to restrictions in Soil Taxonomy, Vitrandic Cryorthents, map unit descriptions are subdivided into Vitrandic Cryorthents, Vitrandic Cryorthents, ashy and Vitrandic Cryorthents, pumiceous. These subdivision were made to provide the Soil Resource Inventory (SRI) user with additional site specific information.

Taxonomic Class: Vitrandic Cryorthents.

Typical Pedon: The representative profile for this soil is on a northeast-facing hillside, under lodgepole pine, at an elevation of 8,050 feet. When described (7/23/84), this soil was moist throughout. Colors are for dry soil unless otherwise noted.

Oe – 1 to 0 inch; decomposed and decomposing lodgepole pine needles, twigs and cones; abrupt wavy boundary.

A – 0 to 2 inches; grayish brown (10YR 5/2) very gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic, few very fine and fine, common medium, coarse and very coarse roots; common very fine, and many fine and medium interstitial pores; 50 percent pumice, rhyolite and obsidian gravel; strongly acid (pH 5.5); gradual wavy boundary.

C1 – 2 to 10 inches; pale brown (10YR 6/3) gravelly coarse sand, dark brown (10YR 3/3) moist; massive, soft, very friable, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; 25 percent pumice, rhyolite and obsidian gravel; strongly acid (pH 5.5); clear wavy boundary.

C2 – 10 to 25 inches; variegated light brownish gray and dark gray (10YR 6/2 and 10YR 4/1) very gravelly coarse sand, brown and very dark gray (10YR 5/3 and 10YR 3/1) moist; massive; soft, very friable, nonsticky and nonplastic; few medium roots; common very fine, and many fine and medium

interstitial pores; 50 percent pumice, rhyolite and quartz gravel; moderately acid (pH 6.0); clear wavy boundary.

C3 – 25 to 40 inches; pinkish gray (7.5YR 7/2) very gravelly coarse sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few medium roots; common very fine, and many fine and medium interstitial pores; 50 percent pumice, rhyolite and quartz gravel; slightly acid (pH 6.5); clear wavy boundary.

C4 – 40 to 60 inches; variegated light gray and dark gray (10YR 7/2 and 10YR 4/1) extremely gravelly coarse sand, dark grayish brown and grayish brown (10YR 4/2 and 10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, and many fine and medium interstitial pores; 90 percent pumice and rhyolite gravel; slightly acid (pH 6.5).

Type Location: About 3.9 miles west on Deadman Campground Road, from its intersection with Highway 395, then 0.15 mile on the southwest fork, then 0.25 mile on the south fork, and 150 feet west of the road; about 500 feet west of the southeast corner of the northeast quarter of the southeast quarter of Section 6, T.3S., R.27E., MDBM, Devil's Postpile NE Quadrangle.

Range in Characteristics: Soil depth to soft bedrock is 29 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 37°F, and the mean summer soil temperature is about 43°F. The 10 to 40 inch textural control section is loamy sand, loamy coarse sand, fine sand, sand, coarse sand, very coarse sand or gravel, with 0 to 5 percent clay. Rock fragments are 3 to 100 percent gravel and 0 to 5 percent cobbles, and average 10 to 60 percent by volume. Gravel-size pumice rock fragments make up 66 to 100 percent of the total rock fragments. Obsidian, rhyolite, quartz or rhyolitic tuff make up the remainder of the rock fragments.

Some pedons do not have a surface organic layer. Other pedons have mineral surface horizons with sand, loamy coarse sand, loamy fine sand, or loamy sand textures.

The A horizon has dry color of 10YR 5/2, 5/3, 6/1, 6/2, 6/3 or 7/2, or 2.5Y 5/2; moist color is 10YR 2/1, 3/1, 3/2, 3/3, 4/3, 5/1 or 5/2. It is loamy sand, sand or coarse sand, with 1 to 7 percent clay. Rock fragments are 5 to 75 percent gravel by volume, and

are mostly pumice, with minor amounts of rhyolite and quartz gravel. Reaction is extremely to slightly acid.

The C horizon has dry color of N4/0, or 10YR 4/1, 5/1, 6/2, 6/3, 6/4, 7/1, 7/2, 7/3 or 8/1, or 7.5YR 4/1, 6/3, 7/2 or 8/3; moist color is 10YR 3/1, 3/2, 3/3, 4/2, 4/3, 4/4, 5/1, 5/2, 5/3, 6/1, 6/2, 7/3 or 8/1, or 7.5YR 4/3. It is loamy sand, loamy coarse sand, fine sand, sand, coarse

sand, very coarse sand or gravel, with 0 to 5 percent clay. Rock fragments are 3 to 100 percent gravel and 5 percent cobbles by volume. The gravel is mostly pumice, with minor amounts of obsidian, rhyolite or rhyolitic tuff. The cobbles are obsidian, rhyolite, quartz or rhyolitic tuff. Reaction is strongly acid to slightly alkaline.

VITRANDIC HAPLODURIDS

These Vitrandic Haplodurids consist of very shallow to moderately deep, well to somewhat excessively drained soils forming in a mixture of rhyolitic ashy alluvium and airfall ash deposits. These soils are on lake terraces and relict shoreline deposits, and have slopes of 0 to 2 percent. Elevation is 6,300 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Vitrandic Haplodurids

Typical Pedon: The representative profile for this soil is on a northwest-facing lake terrace, under black greasewood, saltgrass, shadscale and fourwing saltbush, at an elevation of 6,560 feet. Slope is 2 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 4 inches; light gray (10YR 7/2 sand, light brownish gray (10YR 6/2) moist; single grain; loose, non-sticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; 5 percent fine pebbles; slightly effervescent, lime disseminated; moderately alkaline (pH 8.0); abrupt smooth boundary.

B1 – 4 to 10 inches; light yellowish brown (10 YR 6/4) gravelly coarse sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many fine and very fine interstitial pores; 25 percent fine pebbles; slightly effervescent, lime disseminated; moderately alkaline (pH 8.0); abrupt smooth boundary.

B2kqm – 10 inches; extremely hard lime-silica duripan.

Type Location: About 4,100 feet south and 750 feet west of the southeast corner of Sec. 15, T.1N., R.27E.,

MDBM, Cowtrack Mountain NW Quadrangle.

Range in Characteristics: Soil depth to duripan ranges from 1 to 40 inches. The soil is slightly to moderately alkaline. The mean annual soil temperature at 10 to 20 inches is about 50°F. The mean summer temperature is about 69°F, and the mean winter soil temperature is about 35°F. The pebbles in the soil are pumice, obsidian and mixed granitic or rhyolitic rock. The textural control section is either from 10 inches to the duripan in pedons shallower than 40 inches, or the 10 to 40 inch section in the pedon, if thicker than 40 inches. It is coarse sand, with 0 to 3 percent clay. Rock fragments are 0 to 35 percent pebbles, and average 0 to 40 percent by volume.

The A horizon has dry color of 10YR 6/1, 7/1 or 7/2; moist color is 10YR 4/1, 5/1, 5/2 or 6/2. Textures are sand, loamy sand, or gravelly coarse sand. Gravel content ranges from 5 to 30 percent. Gravel-sized tufa fragments are present in some pedons. The fine earth fraction is ashy.

The B horizon has dry color of 10YR 6/2, 6/4, 7/2, 7.5YR 7/1 or 5Y 7/3; moist color of 10YR 4/2, 4/4, 5/2, 7.5YR 5/1 or 5Y 4/3. Textures are sand, loamy sand, gravelly sand, coarse sand, or gravelly coarse sand. Stratification is usually present. Gravel content ranges from 0 to 35 percent. Gravel-sized tufa fragments are present in some pedons. The fine earth fraction is ashy. The duripan is very hard or extremely hard. Its structure is typically very coarse platy. The pan may be a result of shallow groundwater evaporation associated with spring activity, although decomposing fine ash and obsidian may play a significant role.

VITRANDIC HAPLOXEROLLS

These Vitrandic Haploxerolls consist of very deep, somewhat excessively drained soils forming in material weathering from pumice and obsidian. They are on mountainsides, mountain toeslopes and hillsides, on slopes of 0 to 30 percent. Elevation is 7,200 to 8,400 feet. The mean annual precipitation is about 10 to 15 inches, and the mean annual temperature is about 44°F.

Due to restrictions in Soil Taxonomy, Vitrandic Haploxeroll map unit descriptions are subdivided into Vitrandic Haploxerolls and Vitrandic Haploxerolls, pumiceous. This subdivision was made to provide the Soil Resource Inventory (SRI) user with additional site specific information.

Taxonomic Class: Vitrandic Haploxerolls.

Typical Pedon: The representative profile for this soil is on a west by southwest-facing foothill, under big sagebrush, antelope bitterbrush and grasses, at an elevation of 7,920 feet. Slope is 6 percent. When described (8/28/85), the soil was dry in the upper 10 inches and slightly moist below 10 inches. Colors are for dry soil unless otherwise noted.

Oe – 1/4 to 0 inch; decomposing big sagebrush and bitterbrush plant parts; abrupt smooth boundary.

A1 – 0 to 3 inches; grayish brown (10YR 5/2) gravelly coarse sand, very dark gray (10YR 3/1) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine and fine interstitial pores; 16 percent pumice and obsidian gravel; slightly acid (pH 6.5); clear smooth boundary.

A2 – 3 to 10 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 21 percent pumice and obsidian gravel; slightly acid (pH 6.5); gradual smooth boundary.

C1 – 10 to 22 inches; light brownish gray (10YR 6/2) gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 21 percent pumice and obsidian gravel; neutral (pH 7.0); clear smooth boundary.

C2 – 22 to 25 inches; light brownish gray (10YR 6/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 18 percent pumice and obsidian gravel; neutral (pH 7.0); abrupt wavy boundary.

2A1b – 25 to 30 inches; pinkish gray (7.5YR 6/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 18 percent pumice and obsidian gravel; slightly acid (pH 6.5); gradual smooth boundary.

2A2b – 30 to 45 inches; pinkish gray (7.5YR 6/2) gravelly loamy sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 17 percent tuff gravel; neutral (pH 7.0); gradual smooth boundary.

2C – 45 to 60 inches; pale brown (10YR 6/3) gravelly loamy sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 23 percent tuff gravel; neutral (pH 7.0).

Type Location: About 2.1 miles north of Pilot Springs turnoff, on Highway 120, on east shoulder of road; about 100 feet east and 500 feet south of the northwest corner of the northeast quarter of the southwest quarter of Section 3, T.1S., R.28E., MDBM, Cowtrack Mountain NW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 40°F, and the mean summer soil temperature is about 57°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The 10 to 40 inch textural control section is loamy fine sand, loamy sand, loamy coarse sand, fine sand, sand or coarse sand, with 0 to 6 percent clay. Rock fragments are 3 to 65 percent gravel, and are mostly pumice, with minor amounts of obsidian, tuff and andesite, and average 8 to 64 percent by volume.

Some pedons have surface mineral layers with fine sand or loamy coarse sand textures. Other pedons do not

have organic surface layers.

The surface A horizon has dry color of 10YR 4/1, 4/2, 5/2 or 5/3; moist color is 10YR 2/1, 3/1, 3/2 or 3/3. It is loamy sand, sand or coarse sand, with 1 to 6 percent clay. Rock fragments are 3 to 50 percent gravel by volume, and are mostly pumice, with minor amounts of obsidian, andesite and mixed rocks. Reaction is strongly acid to neutral.

The other A horizons have dry color of 10YR 5/2, 5/3, 6/2 or 7.5YR 6/2; moist color is 10YR 3/2, 3/3 or 4/3. They are loamy sand or loamy coarse sand, with 1 to 4 percent clay. Rock fragments are 5 to 30 percent gravel

by volume, and are mostly pumice, with minor amounts of obsidian, andesite and mixed rocks. Reaction is strongly to slightly acid.

The C horizon has dry color of 10YR 3/1, 5/2, 5/3, 5/4, 6/1, 6/2, 6/3, 6/4, 7/1, 7/2, 7/3, 7/4 or 8/1; moist color is 10YR 2/1, 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, 5/1, 5/2, 5/3, 5/4 or 7/2. It is loamy fine sand, loamy sand, loamy coarse sand, fine sand, sand, coarse sand or very coarse sand, with 0 to 6 percent clay. Rock fragments are 5 to 75 percent gravel by volume, and are mostly pumice, with minor amounts of obsidian, 0 to 15 percent andesite cobbles and 0 to 5 percent andesite stones by volume. Reaction is strongly acid to neutral.

VITRANDIC TORRIORTHENTS

These Vitrandic Torriorthents consist of moderately deep to very deep, well to somewhat excessively drained soils forming in sandy beach deposits on old lake beaches, shorlines, sideslopes of alluvial fans, hillsides and canyon walls, and have slopes of 0 to 60 percent. Elevation is 5,800 to 9,300 feet. The mean annual precipitation is about 6 to 25 inches, and mean annual temperature is about 48°F.

Due to restrictions in Soil Taxonomy, Vitrandic Torriorthent map unit descriptions are subdivided into Vitrandic Torriorthents, sodic, Vitrandic Torriorthents, ashy and Vitrandic Torriorthents, gravelly. These subdivisions were made to provide the Soil Resource Inventory (SRI) user with additional site specific information.

Taxonomic Class: Vitrandic Torriorthents

Typical Pedon: The representative profile for this soil is on a northwest-facing lake terrace, under saltgrass, rubber rabbitbrush and Russian thistle, at an elevation of 6,355 feet. Slope is 1 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 8 inches; light gray (10YR 7/1) sand, light gray (10YR 6/1) moist; single grain; loose, nonsticky and nonplastic; many very fine, fine and medium roots; many very fine interstitial pores; 2 percent fine pebbles; slightly effervescent, lime disseminated; moderately alkaline (pH 8.0); abrupt smooth boundary.

A2 – 8 to 12 inches; pale yellow (5Y 7/3) sand, olive (5Y 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine, fine and medium roots; many very fine interstitial pores; slightly effervescent, lime disseminated; moderately alkaline (pH 8.0); abrupt smooth boundary.

2C1 – 12 to 27 inches; light gray and grayish brown (10YR 7/1, 2.5Y 5/2) stratified silt loam, fine sandy loam, sand and gravelly sand, gray and very dark grayish brown (10YR 5/1, 2.5Y 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; slightly effervescent, lime disseminated; moderately alkaline (pH 8.0); abrupt smooth boundary.

3C2 – 27 to 60 inches; light gray (10YR 7/1) coarse sand, light gray (10YR 6/1) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very

fine roots; many very fine interstitial pores; slightly effervescent, lime disseminated; strongly alkaline (pH 8.5).

Type Location: About 8 miles east of Lee Vining on the shore of Mono Lake, 0.25 miles northwest of dirt road; at southwest corner of the northeast quarter of the southwest quarter, Sec. 11, T.1N., R.27E., MDBM, Cowtrack Mountain NW Quadrangle.

Range in Characteristics: Soil depth to bedrock is 34 to greater than 60 inches, and the soil can be dry from mid-May to October. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 35°F. The textural control section is either from 10 inches to the lithic contact in pedons shallower than 40 inches, or the 10 to 40 inch section in pedons deeper than 40 inches. It is silty clay loam, loamy fine sand, fine sand, sand or coarse sand, with 0 to 30 percent clay. Rock fragments are 0 to 40 percent gravel, 5 to 40 percent cobbles, 0 to 15 percent stones and 0 to 5 percent boulders, and average 0 to 44 percent by volume. Pumice rock fragments are less than 2/3 of the total rock fragments by volume. They are gravel, and average 21 to 29 percent by volume. Cobbles, stones and boulders are mixed and rhyolitic rock, and average 20 to 22 percent by volume.

The A horizons have dry color of 10YR 6/1, 6/3, 7/1 or 5Y 6/2, 7/3 or 2.5Y 6/2; moist color is 10YR 3/3, 4/1, 5/1, 6/1 or 5Y 5/2, 5/3 or 2.5Y 4/2, 5/2. Textures are silty clay loam, silt loam, fine sandy loam, loamy sand, sand, coarse sand, or gravelly coarse sand, with 0 to 30 percent clay. Rock fragments are 0 to 55 percent gravel, 0 to 20 percent cobbles, 0 to 30 percent stones and 0 to 10 percent boulders by volume. Gravel is mostly pumice, with minor amounts of mixed, rhyolitic or obsidian rock. The cobbles, stones and boulders are mixed or rhyolitic rocks. A vesicular layer may be present near the soil surface. Reaction is slightly acid to very strongly alkaline. The electrical conductivity of the saturation extract ranges from 1 to 15 mmhos/cm, and exchangeable sodium percentages range from 15 to 90. Boron content is 2 to 70 ppm.

The C horizons have dry color of 10YR 6/1, 6/3, 7/1, 7/2, or 2.5Y 5/2, 6/2 or 5Y 6/1, 6/2 or N8/0; moist color is 10YR 3/3, 4/1, 4/3, 5/1, 5/3, 6/1 or 7.5YR 4/4 or 5Y 4/1, 4/2, 5/2, 6/2 or 2.5Y 3/2, 4/2, 5/2 or N8/0.

It is silty clay loam, silt loam, loam, fine sandy loam, loamy fine sand, loamy sand, fine sand or coarse sand, with 0 to 33 percent clay. The C horizon is stratified with layers of sand. Hard bedrock may occur below a depth of 20 inches on Paoha and Negit Islands. Rock fragments are 0 to 40 percent gravel, 5 to 40 percent cobbles, 0 to 15 percent stones and 0 to 5 percent boulders by volume. Gravel is mostly pumice, with minor amounts

of mixed, rhyolitic or obsidian rock. The cobbles, stones and boulders are mixed or rhyolitic rocks. Reaction is slightly acid to very strongly alkaline. Some pedons do not have carbonates. The electrical conductivity of the saturation extract ranges from 2 to 10 mmhos/cm, and the exchangeable sodium percentage ranges from 15 to 50. Boron content is 2 to 20 ppm.

VITRANDIC TORRIPSAMMENTS

These Vitrandic Torrripsamments consist of very deep, somewhat excessively drained soils forming in fan and lake terraces. These soils are on interdune areas and lake terraces, and have slopes of 2 to 30 percent. Elevation is 6,400 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Vitrandic Torrripsamments

Typical Pedon: The representative profile is on a southwest-facing lake terrace, under rubber rabbitbrush, hairy horsebrush, fourwing saltbush and black greasewood, at an elevation of 6,530 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; light brownish gray (10YR 6/2) gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine, common medium and coarse roots; many very fine and fine interstitial pores; neutral (pH 6.8); clear wavy boundary.

A2 – 2 to 9 inches; light brownish gray (10YR 6/2) gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine common medium and coarse roots; many very fine and fine interstitial pores; neutral (pH 7.0); clear wavy boundary.

A3 – 9 to 19 inches; light brownish gray (10YR 6/2) gravelly coarse sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine; common medium and coarse roots; many very fine and fine interstitial pores; neutral (pH 7.0); abrupt wavy boundary.

Ab – 19 to 28 inches; very pale brown (10YR 7/3) gravelly sand; brown to dark brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; neutral (pH 7.2); clear wavy boundary.

C – 28 to 60 inches; very pale brown (10YR 7/3) coarse sand, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; slightly alkaline (pH 7.8).

Type Location: In the Bodie-Coleville Soil Survey, about 1.65 miles west on west Portal road, from intersection with highway 395, .28 miles on southeast road on the north shoulder of the road.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean soil temperature is about 62°F. The difference between the mean annual summer and winter soil temperature is greater than 9°F. The 10 to 40 inch textural control section is coarse sand or sand, with 0 to 3 percent clay. Rock fragments are pumice, tuff and obsidian, and are 5 to 35 percent by volume.

The A horizon has dry color of 10YR 6/2, 6/3 or 7/2; moist is 10YR 3/2, 4/2, 4/3 or 5/2. It is gravelly coarse sand. Rock fragments are mostly gravel, and average 5 to 30 percent. The organic carbon content is 0.2 to 0.6 percent. Reaction is neutral.

The C horizon has dry color of 10YR 6/2, 6/3, 7/2 or 7/3; moist is 10YR 4/2, 4/3, 5/2 or 5/3. It is coarse sand. Rock fragments are gravel, and average 5 to 30 percent by volume. Reaction is slightly alkaline.

VITRANDIC XEROCHREPTS

These Vitrandic Xerochrepts consist of very deep, well drained soils forming in material weathering from pumice and andesite rock. These soils are on mountainsides and moraine sideslopes, and have slopes of 30 to 60 percent. Elevation is 7,500 to 8,000. The mean annual precipitation is about 12 to 30 inches, and mean annual temperature is about 44°F.

Taxonomic Class: Vitrandic Xerochrepts

Typical Pedon: The representative profile for this soil is on a south by southeast-facing mountainside, under red fir and Jeffrey pine, at an elevation of 7,680 feet. Slope is 33 percent. When described (8/14/87), the soil was dry throughout. Colors are for dry soil unless otherwise noted.

A – 0 to 1 inch; grayish brown (10YR 5/2) gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; many very fine and fine interstitial pores; 30 percent pumice gravel; slightly acid (pH 6.5); abrupt wavy boundary.

2C1 – 1 to 14 inches; variegated white and yellow (10YR 8/1 and 10YR 8/6) pumice gravel, white and brownish yellow (10YR 8/2 and 10YR 6/6) moist; single grain; loose, nonsticky and nonplastic; common fine and medium roots; few very fine and fine, and many medium interstitial pores; slightly acid (pH 6.5); abrupt wavy boundary.

3C2 – 14 to 16 inches; light gray (10YR 7/2) gravelly loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 25 percent pumice and andesite gravel; neutral (pH 7.0); abrupt wavy boundary.

4A – 16 to 32 inches; pale brown (10YR 6/3) extremely cobbly loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium, and common coarse roots; many very fine and fine interstitial pores; 25 percent pumice and andesite gravel and 40 percent andesite cobbles; moderately acid (pH 6.0); abrupt wavy boundary.

4Bw – 32 to 51 inches; light yellowish brown (10YR 6/4) extremely cobbly sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable,

nonsticky and nonplastic; few very fine, fine and medium, and common coarse roots; many very fine and fine interstitial pores; 25 percent pumice and andesite gravel and 40 percent andesite cobbles; moderately acid (pH 6.0); abrupt wavy boundary.

5C – 51 to 60 inches; brown (10YR 4/3) cobbly silt loam, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; many very fine and fine interstitial pores; 7 percent pumice gravel and 10 percent andesite cobbles; moderately acid (pH 6.0).

Type Location: About 3.75 miles west on Highway 203, from its intersection with Highway 395, then 11.85 miles north on Reds Meadow Campground Road, on the north shoulder of the road; about 850 feet east and 825 feet north of the southwest corner of the northwest quarter of Section 2, T.4S., R.26E., MDBM, Devil's Postpile NE Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 44°F, and the mean summer soil temperature is about 61°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The 10 to 40 inch textural control section is fine sandy loam, sandy loam, loamy sand, coarse sand or gravel, with 0 to 6 percent clay. Rock fragments are 5 to 100 percent pumice and andesite gravel, 0 to 40 percent andesite cobbles and 25 percent andesite stones, and average 46 to 67 percent by volume. The upper part of the control section averages 100 percent pumice rock fragments by volume. The lower part averages 40 to 62 percent rock fragments by volume. Pumice makes up 50 to 63 percent of the total rock fragments in the lower part. The remainder of the rock fragments are andesite.

Some pedons have a surface organic layer.

The A horizon has dry color of 10YR 5/2; moist color is 10YR 3/2. It is coarse sand, with 1 to 2 percent clay. Rock fragments are 30 to 35 percent pumice gravel by volume. Reaction is very strongly to moderately acid.

The buried A horizons have dry color of 10YR 6/3 or 7/1; moist color is 10YR 4/3 or 6/2. They are fine sandy loam or loam, with 2 percent clay. Rock fragments are 5 to 25 percent pumice and andesite gravel and 0 to 40

percent andesite cobbles by volume. Reaction is strongly to moderately acid.

The B horizon has dry color of 10YR 6/1, 6/3 or 6/4; moist color is 10YR 3/4, 4/1, 4/3 or 4/4. It is fine sandy loam or sandy loam, with 3 to 6 percent clay. Rock fragments are 5 to 55 percent pumice and andesite gravel, 0 to 40 percent andesite cobbles and 0 to 20 percent andesite stones by volume. Reaction is

moderately acid.

The C horizon has dry color of 10YR 4/3, 7/2, 8/1 or 8/6; moist color is 10YR 4/3, 6/6 or 8/2, or 2.5Y 4/2. It is silt loam, loamy sand or gravel, with 0 to 5 percent clay. Rock fragments are 7 to 100 percent pumice and andesite gravel and 0 to 10 percent andesite cobbles by volume. Reaction is moderately acid to neutral.

VITRANDIC XEROFLUVENTS

These Vitrandic Xerofluvents consist of very deep, somewhat excessively drained soils forming in pumice and ash. These soils are in mountain basins and depressions, and have slopes of 0 to 15 percent. Elevation is 6,800 to 7,200 feet. The mean annual precipitation is about 8 to 12 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Vitrandic Xerofluvents

Typical Pedon: The representative profile for this soil is on an southeast-facing mountain basin, under big sagebrush, rabbitbrush, silver sagebrush, California rose and California styrax, at an elevation of 7,280 feet. Slope is 1 percent. Colors are for dry soil unless otherwise noted.

Oi – 1 to 0 inch; decomposed and decomposing big sagebrush, rabbitbrush and silver sagebrush leaves and twigs; abrupt smooth boundary.

A – 0 to 2 inches; dark gray (10YR 4/1) gravelly sandy loam, black (N2/0) moist; single grain; loose, very friable, nonsticky and nonplastic; few very fine roots; many very fine and common fine interstitial pores; 20 percent gravel; neutral (pH 7.0); clear smooth boundary.

2A – 2 to 12 inches; dark gray (10YR 4/1) gravelly sandy loam, black (10YR 2/1) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; many very fine and common fine interstitial pores; 27 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

3A – 12 to 39 inches; gray (10YR 6/1) gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine, medium and coarse roots; common very fine and few fine interstitial pores; 20 percent gravel; slightly alkaline (pH 7.5); abrupt smooth boundary.

4A – 39 to 41 inches; gray (10YR 6/1) gravelly loamy sand, very dark gray (10YR 3/1) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine interstitial pores; 2

percent gravel; slightly alkaline (pH 7.5); abrupt way boundary.

5A – 41 to 46 inches; gray (10YR 5/1) sandy loam, black (N2/0) moist; massive; slightly hard, friable, nonsticky and nonplastic; few medium and coarse roots; common very fine and fine interstitial pores; 2 percent gravel; moderately alkaline (pH 8.0); abrupt smooth boundary.

6A – 46 to 60 inches; gray (10YR 6/1) gravelly sand; dark grayish brown (10YR 4/2) moist; slightly hard, very friable, nonsticky and nonplastic; few medium roots; few very fine and fine interstitial pores; 15 percent gravel; moderately alkaline (pH 8.0).

Type Location: About 2 miles east on Arcularius Ranch Road, from its intersection with Highway 395, just north of Rest Area, then 2.2 miles north on Forest Service Road 2S04, then 1.75 miles on east fork, then 1.15 miles north on Forest Service Road 1S47, and 50 feet west of road.

Range in Characteristics: Soil depth is 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The 10 to 40 inch textural control section is coarse sand, sand, loamy sand or sandy loam, with 0 to 12 percent clay. Rock fragments are 2 to 30 percent gravel. Volcanic ash is very prominent throughout the profile and gravel is primarily pumice.

Some pedons lack thin surface organic layers. Other pedons have C horizons.

The A horizons have dry color of 10YR 3/1, 4/1, 5/1 or 6/1; moist color is 10YR 2/1, 3/1, 3/2, 4/2 or N2/. It is coarse sand, sand, loamy sand or sandy loam, with 0 to 12 percent clay. Rock fragments are 2 to 30 percent gravel. Reaction is slightly acid to slightly alkaline.

The C horizons (if present) have dry color of 10YR 6/1 or 5/1; moist color is 10YR 3/1, 4/1 or 5/1. It is sand, loamy sand or sandy loam, with 0 to 7 percent clay. Rock fragments are 2 to 20 percent gravel. Reaction is neutral to moderately alkaline.

VITRANDIC XERORTHENTS

These Vitrandic Xerorthents soils consist of very deep, somewhat excessively drained soils forming in pumice, obsidian and rhyolitic rock. These soils are on mountainsides, mountain flats and mountain basins, benches and hillsides, and have slopes of 0 to 70 percent. Elevation is 6,500 to 11,200 feet. The mean annual precipitation is about 10 to 45 inches, and the mean annual temperature is about 40°F.

Due to restrictions in Soil Taxonomy, Vitrandic Xerorthents map unit descriptions are subdivided into Vitrandic Xerorthents, Vitrandic Xerorthents, ashy, Vitrandic Xerorthents, ashy, warm, Vitrandic Xerorthents, pumiceous and Vitrandic Xerorthents, pumiceous, warm. These subdivisions were made to provide the Soil Resource Inventory (SRI) user with additional site specific information.

Taxonomic Class: Vitrandic Xerorthents.

Typical Pedon: The representative profile for this soil is on a north-facing mountain flat, under Jeffrey pine and lodgepole pine, at an elevation of 7,600 feet. Slope is 2 percent. When described (8/9/84), the soil was dry in the upper 2 inches, and very slightly moist in the rest of the profile. Colors are for dry soil unless otherwise noted.

Oe – 3 to 0 inches; decomposing Jeffrey pine and lodgepole pine needles, twigs and cones; abrupt smooth boundary.

A1 – 0 to 2 inches; grayish brown (10YR 5/2) loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak medium platy structure; soft, very friable, nonsticky and nonplastic; many very fine and fine interstitial pores; 13 percent pumice and rhyolitic gravel; very strongly acid (pH 5.0); clear wavy boundary.

A2 – 2 to 10 inches; light brownish gray (10YR 6/2) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine, medium and coarse roots; many very fine and fine interstitial pores; 23 percent pumice and rhyolitic gravel; strongly acid (pH 5.2); clear wavy boundary.

2C1 – 10 to 14 inches; very pale brown (10YR 7/3) gravelly loamy coarse sand, brown (10YR 4/3) moist; weak thin and medium platy structure; soft, very

friable, nonsticky and nonplastic; few fine, medium and coarse roots; many very fine and fine interstitial pores; 25 percent pumice and rhyolitic gravel; strongly acid (pH 5.3); abrupt wavy boundary.

2C2 – 14 to 19 inches; variegated white and gray (10YR 8/1 and 10YR 5/1) extremely gravelly coarse sand, white and dark gray (2.5Y 8/2 and 10YR 4/1) moist; single grain; loose; nonsticky and nonplastic; few fine and medium roots; many fine, medium and coarse interstitial pores; 93 percent pumice and rhyolitic gravel; strongly acid (pH 5.2); abrupt wavy boundary.

3C3 – 19 to 22 inches; very pale brown (10YR 7/3) very gravelly coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many fine and medium pores; 60 percent pumice and rhyolitic gravel; strongly acid (pH 5.2); abrupt wavy boundary.

3C4 – 22 to 32 inches; variegated white and gray (10YR 8/1 and 10YR 5/1) extremely gravelly coarse sand, white and dark gray (2.5Y 8/2 and 10YR 4/1) moist; single grain; loose, nonsticky and nonplastic; few fine and medium roots; many fine, medium and coarse interstitial pores; 90 percent pumice and rhyolitic gravel; strongly acid (pH 5.2); abrupt smooth boundary.

4C5 – 32 to 33 inches; white (N8/0) loamy sand, light gray (10YR 7/1) moist; moderate medium platy structure; soft, very friable, nonsticky and nonplastic; few very fine and fine tubular pores; 6 percent pumice gravel; strongly acid (pH 5.2); abrupt smooth boundary.

4C6 – 33 to 60 inches; light brownish gray (10YR 6/2) loamy sand, very dark gray (10YR 3/1) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and medium pores; 12 percent pumice gravel; strongly acid (pH 5.3).

Type Location: About 1.5 miles west on Deadman Camp Road, from its intersection with Highway 395, and 110 feet east of road; about 300 feet east and 650 feet north of the southeast corner of the southeast quarter of the northeast quarter of Section 33, T.2S., R.27E., MDBM, Mt. Morrison NW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 38°F, and the mean summer soil temperature is about 55°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The 10 to 40 inch textural control section is loamy fine sand, fine sand, sand, loamy sand, loamy coarse sand, coarse sand or gravel, with 0 to 14 percent clay. Rock fragments are 0 to 100 percent gravel and 0 to 5 percent rhyolitic cobbles, and average 12 to 83 percent by volume. The upper part of the textural control section is 100 percent pumice gravel by volume. The lower part is 80 to 100 percent of the total rock fragments by volume. The remainder of the rock fragments are rhyolitic and obsidian.

Some pedons have surface horizons with fine sand or sand textures. Other pedons do not have a surface organic layer. In additions some pedons may have E horizons or buried A horizons.

The surface A horizon has dry color of 10YR 5/1, 5/2, 5/3, 6/1, 6/2, 6/3, 6/4 or 7.5YR 4/2, 4/6, 7/2 or 5YR 5/3; moist color is 10YR 2/1, 3/1, 3/2, 4/2, 4/4 or 7.5YR 3/2, 7/2 or 5YR 3/4 or 5Y 2.5/1 or 3/2. It is loamy sand, loamy coarse sand, fine sand, sand or coarse sand, with 0 to 5 percent clay. Rock fragments are 6 to 85 percent gravel by volume, and are mostly pumice, with minor

amounts of rhyolite. Reaction is very strongly acid to neutral.

The other A horizons have dry color of 10YR 5/2, 5/3, 6/1, 6/2, 6/4 or 5YR 5/3; moist color is 10YR 3/1, 3/2, 4/1, 4/2, 4/4, 5/2 or 5YR 3/4 or 5Y 3/2 or 3/3. It is loamy fine sand, loamy sand, loamy coarse sand, coarse sand or sand, 1 to 3 percent clay. Rock fragments are 5 to 75 percent gravel by volume, and are mostly pumice, with minor amounts of rhyolite and obsidian. Reaction is strongly acid to neutral.

The E horizon has dry color of 10YR 6/3; moist color is 10YR 3/3. It is loamy sand, with 1 to 2 percent clay. Rock fragments are 6 to 16 percent pumice gravel by volume. Reaction is moderately acid.

The C horizon has dry color of N8/0, or 10YR 4/1, 5/1, 5/2, 5/3, 6/1, 6/2, 6/3, 7/1, 7/2, 7/3, 8/1, 8/2, 8/3, 8/4 or 5Y 7/1 or 2.5Y 8/2, 8/3 or 8/4; moist color is 10YR 3/1, 3/2, 3/3, 4/1, 4/2, 4/3, 4/4, 5/1, 5/2, 5/3, 5/4, 6/2, 6/3, 6/4, 7/1 or 7/2 or 2.5Y 7/2, 7/3, 7/4, or 8/2. It is loamy fine sand, loamy sand, loamy coarse sand, fine sand, sand, coarse sand or gravel, with 0 to 14 percent clay. Rock fragments are 0 to 100 percent gravel and 0 to 5 percent cobbles by volume, and are mostly pumice, with minor amounts of rhyolite and obsidian. Reaction is strongly acid to slightly alkaline.

VITRANDIC XEROPSAMMENTS

These Vitrandic Xeropsamments consist of moderately deep to very deep, somewhat excessively drained soils forming in material weathering from pumice and rhyolitic rock. These soils are on mountainsides, mountain flats and basins, mountain bottomlands, hillsides and glacial outwash plains, and have slopes of 0 to 70 percent. Elevation is 6,500 to 11,200 feet. The mean annual precipitation is about 8 to 35 inches, and the mean annual temperature is about 41°F.

Due to restrictions in Soil Taxonomy, Vitrandic Xeropsamment map unit descriptions are subdivided into Vitrandic Xeropsamments and Vitrandic Xeropsamments, warm. This subdivision was made to provide the Soil Resource Inventory (SRI) user with additional site specific information.

Taxonomic Class: Vitrandic Xeropsamments.

Typical Pedon: The representative profile for this soil is on a north-facing mountainside, under red fir and Jeffrey pine, at an elevation of 8,000 feet. Slope is 36 percent. When described (8/25/83), the soil was moist throughout. Colors are for dry soil unless otherwise noted.

Oi – 2 to 0 inch; decomposing red fir and Jeffrey pine needles and twigs; abrupt wavy boundary.

A1 – 0 to 3 inches; pale brown (10YR 6/3) loamy coarse sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 6 percent pumice gravel; moderately acid (pH 5.6); gradual wavy boundary.

A2 – 3 to 7 inches; pale brown (10YR 6/3) loamy coarse sand, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 8 percent pumice gravel; strongly acid (pH 5.3); clear wavy boundary.

C1 – 7 to 13 inches; very pale brown (10YR 7/3) loamy sand, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 6 percent pumice gravel; very strongly acid (pH 4.9); gradual wavy boundary.

2C2 – 13 to 34 inches; light gray (10YR 7/2) loamy coarse sand, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few fine, medium, coarse and very coarse roots; many very fine and fine interstitial pores; 8 percent pumice gravel; very strongly acid (pH 4.9); clear wavy boundary.

3C3 – 34 to 60 inches; light gray (10YR 7/1) loamy sand, grayish brown (10YR 5/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few medium, coarse, and very coarse roots; many very fine and fine interstitial pores; 8 percent pumice gravel; extremely acid (pH 4.3).

Type Location: About 2.4 miles northwest on Forest Service Road 3S25, from its intersection with Highway 203, then 1.0 mile north on Forest Service Road 3S36, then 0.55 mile west on Forest Service Road 3S35, then 0.1 mile south on Forest Service Road 3S48, on the upslope shoulder of the road; about 800 feet west of the northeast corner of the southeast quarter of Section 23, T.3S., R.27E., Mt. Morrison NW Quadrangle.

Range in Characteristics: Soil depth to the bedrock is 38 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 43°F, and the mean summer soil temperature is about 58°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The soil moisture control section is 12 to 35 inches. It is usually dry from early June to mid-October, and is usually moist the rest of the year. The textural control section is from 10 inches to the lithic contact in pedons shallower than 40 inches, and is the 10 to 40 inch section in pedons deeper than 40 inches. It is loamy fine sand, loamy sand, loamy coarse sand, fine sand, sand or coarse sand, with 1 to 7 percent clay. Rock fragments are 5 to 33 percent pumice, obsidian and rhyolite gravel, dominated by pumice, and 0 to 5 percent obsidian and rhyolite cobbles, and average 5 to 30 percent by volume.

Some pedons have surface layers with coarse sand, sand, fine sand or sandy loam textures. Some pedons have surface layers up to 3 inches thick. Other pedons have buried B horizons at depths greater than 40 inches. Other pedons do not have a surface organic layer.

The A horizon has dry color of 10YR 4/1, 5/1, 5/2, 6/1, 6/2, 6/3 or 7/2; moist color is 10YR 2/1, 3/2, 3/3, 4/1, 4/2, 4/3, 5/2 or 5/3. It is loamy fine sand, loamy sand,

loamy coarse sand, sand or coarse sand, with 1 to 6 percent clay. Rock fragments are 0 to 60 percent gravel by volume. The gravel is dominated by pumice, with small amounts of obsidian and mixed gravel. Reaction is very strongly acid to neutral.

The C horizon has dry color of 10YR 5/1, 5/2, 6/2, 6/3, 6/4, 7/1, 7/2, 7/3, 8/2, or 7.5YR 7/2, 8/4, or

N8/0, N2/0; moist color is 10YR 3/2, 3/3, 4/2, 4/3, 4/4, 5/1, 5/2, 5/3, 6/3, 7/2 or 7.5YR 4/4, 5/4, or 2.5Y 5/2, or 5Y 5/6 or N2/0. It is loamy fine sand, loamy sand, loamy coarse sand, fine sand, sand or coarse sand, with 1 to 5 percent clay. Rock fragments are 5 to 50 percent pumice, obsidian and rhyolite gravel and cobbles by volume. Reaction is extremely acid to neutral.

WATERMAN FAMILY

The Waterman family consists of shallow, well to somewhat excessively drained soils forming in material weathered from granitic till, adamellite or basalt. These soils are on foothills and moraines, and have slopes of 15 to 60 percent. Elevation is 4,400 to 8,600 feet. The mean annual precipitation is about 4 to 17 inches, and the mean annual temperature is about 51°F.

Taxonomic Class: Sandy-skeletal, mixed, mesic Lithic Xerorthents

Typical Pedon: The representative profile for this soil is a east-facing hillside, under big sagebrush and bitterbrush, at an elevation of 6,480 feet. Colors are for dry soil unless otherwise noted.

A – 0 to 3 inches; brown (10YR 5/3) extremely bouldery loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine, fine and medium interstitial pores; 60 percent gravel, 10 percent stones and 25 percent boulders; neutral (pH 6.6); clear smooth boundary.

C1 – 3 to 6 inches; pale brown (10YR 6/3) extremely bouldery loamy sand, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine roots; many very fine, fine and medium tubular pores; 35 percent gravel, 10 percent stones and 30 percent boulders; neutral (pH 6.6); clear wavy boundary.

C2 – 6 to 12 inches; pale brown (10YR 6/3) extremely

bouldery sand, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine, fine and medium tubular pores; 40 percent gravel, 10 percent cobbles and 30 percent boulders; neutral (pH 6.6); clear wavy boundary.

R – 12 inches; hard adamellite bedrock

Type Location: About 300 feet west of the northeast corner of the northeast quarter of the southwest quarter of Section 21, T.7S., R.31E., MDBM, Mt. Tom SE Quadrangle.

Range in Characteristics: Soil depth is 7 to 20 inches to lithic contact. The mean annual soil temperature at 10 inches is 55°F. The mean summer temperature is about 69°F, and the mean winter temperature is about 35°F. The textural control section is the 10 inch section to lithic contact portion, and is loamy sand, loamy coarse

The A horizon has dry color of 10YR 5/2 or 5/3; moist color is 10YR 4/2, 3/3 or 3/2. It is loamy sand, with 0 to 7 percent clay. Rock fragments are 15 to 60 percent gravel, 0 to 15 percent cobbles, 0 to 15 percent stones and 0 to 40 percent boulders, and average 40 to 80 percent by volume. Reaction is neutral.

The C horizons have dry color of 10YR 5/3, 5/4 or 6/3; moist color is 10YR 5/3, 4/3, 4/2 or 3/3. It is loamy sand, coarse loamy sand, sand or coarse sand, with 0 to 4 percent clay. Rock fragments are 0 to 45 percent gravel, 0 to 20 percent cobbles, 0 to 15 percent stones and 0 to 30 percent boulders, and average 40 to 75 percent by volume. Reaction is neutral.

WATTERSON FAMILY

The Watterson family consists of very deep, well drained soils forming in mixed alluvium and volcanic ash. These soils are on alluvial fans and lake terraces, and have slopes of 5 to 15 percent. Elevation is 5,700 to 7,600 feet. The mean annual precipitation is about 6 to 15 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Loamy-skeletal, mixed, mesic Pachic Haploxerolls

Typical Pedon: The representative profile for this soil is on east-facing lake terrace, under big sagebrush, antelope bitterbrush, Indian ricegrass and western needlegrass, at an elevation of 6,900 feet. Slope is 1 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 8 inches; pale brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, and few fine and medium roots; common very fine interstitial pores; 3 percent gravel; slightly acid (pH 6.1); clear wavy boundary.

A2 – 8 to 35 inches; pale brown (10YR 5/3) very gravelly sandy loam, brown (10YR 3/3) moist; weak fine angular blocky structure; hard, very friable, nonsticky and nonplastic; few fine and medium roots; common very fine interstitial pores; 35 percent gravel and 15 percent cobbles; slightly acid (pH 6.1); abrupt smooth boundary.

2C – 35 to 60 inches; light yellowish brown (2.5Y 6/4) sand, dark yellowish brown (10YR 4/4) moist; single grain, loose, nonsticky and nonplastic; few very fine roots; many fine interstitial pores; 2 percent

gravel; neutral (pH 7.0).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 2 miles west of Crowley Lake, California and 4 miles east-by-northeast of the Mammoth Airport, and 20 feet northwest of the dirt road; about 250 feet east and 200 feet north of the southwest corner of Section 33, T.3S., R.29E., MDBM, Mount Morrison Quadrangle.

Range in Characteristics: Soil depth is 60 inches or greater. The A horizon is 25 to 40 inches thick. The mean annual soil temperature at 20 inches is about 50°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The 10 to 40 inch textural control section is very gravelly sandy loam or sand, with 8 to 15 percent clay. Rock fragments are mainly gravel and cobbles, and average 35 to 60 percent by volume.

The A horizon has dry color of 10YR 5/2 or 5/3; moist color is 10YR 3/2 or 3/3. It is sandy loam, gravelly sandy loam and very gravelly sandy loam. Rock fragments are 2 to 15 percent in the upper part and 35 to 60 percent in lower part, and are mostly gravel, with lesser amounts of cobbles. Structure is weak subangular or angular blocky, or it is single grain or massive. The organic carbon content is 0.6 to 1.0 percent.

The C horizon has dry color of 10YR 5/3 or 6/3, or 2.5Y 6/4; moist color is 10YR 4/3 or 4/4, or 2.5Y 4/4. It is very gravelly sandy loam or sand. Strata of loamy sand or gravelly sandy loam are present in some areas. Rock fragments are 20 to 60 percent gravel and 5 to 20 percent cobbles, and average 35 to 60 percent by volume. Structure is weak subangular blocky, or the horizon is massive or single grain.

WHITEWOLF FAMILY

The Whitewolf family consists of moderately deep to deep, somewhat excessively drained soils, forming in residuum and colluvium from granitic rocks. These soils are on lower hillsides, and have slopes of 5 to 60 percent. Elevation is 4,000 to 6,800 feet. The mean annual precipitation is about 4 to 8 inches, and the mean annual temperature is about 55°F.

Taxonomic Class: Mixed, thermic Xeric Torripsamments

Typical Pedon: The representative profile for this soil is on a east-facing sideslope, under blackbrush, Nevada ephedra, California buckwheat and desert needlegrass, at an elevation of 4,700 feet. Slope is 30 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; light brownish gray (10YR 6/2) coarse sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; 5 percent gravel; neutral (pH 6.8); abrupt smooth boundary.

A2 – 2 to 18 inches; light brownish gray (10YR 6/2) loamy coarse sand; dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; many very fine interstitial pores; 5 percent gravel; neutral (pH 7.3); gradual wavy boundary.

C – 18 to 43 inches; brown (10YR 5/3) loamy coarse sand, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and few fine and medium roots; many very fine interstitial pores; 5 percent gravel and 5

percent cobbles; slightly alkaline (pH 7.7); abrupt irregular boundary.

R – 43 inches; hard granodiorite bedrock.

Type Location: In the Benton-Owens Valley Soil Survey area, about 5 miles west of Bishop, northwest of the southwest corner of the northeast corner of Section 7, T7S, R36E., MDBM, Bishop, Quadrangle.

Range in Characteristics: Depth to hard bedrock is 20 to 60 inches. The mean annual soil temperature at 20 inches is about 60°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The textural control section is 10 to 40 inches or paralithic or lithic contact, with a loamy coarse sand, and 0 to 3 percent clay. Rock fragments are 0 to 10 percent gravel and 0 to 5 percent cobbles. Base saturation is 90 to 100 percent.

Some pedons have a paralithic horizon above the lithic contact.

The A horizon has dry color of 10YR 6/2 or 6/3; moist color is 10YR 4/2 or 4/3. It is coarse sand or loamy coarse sand, with 5 to 15 percent gravel. The organic carbon content is 0.2 to 0.4 percent. Reaction is neutral.

The C horizon has dry color of 10YR 5/3 or 6/3; moist color is 10YR 4/3 or 4/4. It is loamy coarse sand, with 0 to 3 percent clay. Rock fragments are 5 to 10 percent gravel, 0 to 5 percent cobbles and 0 to 3 percent stones, and average 5 to 15 percent by volume. Reaction is slightly alkaline.

WRANGO FAMILY

The Wrango family consists of very deep, somewhat excessively drained soils forming in material weathering from granitic and mixed rocks. These soils are on mountainsides, hillsides, canyon slopes, bench terraces, outwash plains, foothills, alluvial fans, moraines and glacial bottom lands, and have slopes of 0 to 90 percent. Elevation is 4,000 to 12,300 feet. The mean annual precipitation is about 4 to 30 inches, and the mean annual temperature is about 45°F.

Taxonomic Class: Sandy-skeletal, mixed, mesic Xeric Torriorthents.

Typical Pedon: The representative profile for this soil is on an east-facing moraine, under big sagebrush, antelope bitterbrush and grasses, at an elevation of 7,200 feet. Slope is 10 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 4 inches; grayish brown (10YR 5/2) loamy coarse sand, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine and medium roots; many very fine and fine interstitial pores; 10 percent gravel; neutral (pH 6.8); clear wavy boundary.

A2 – 4 to 10 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine and fine interstitial pores; 10 percent gravel and 5 percent cobbles; neutral (pH 6.8); clear wavy boundary.

A3 – 10 to 15 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; many very fine, fine and medium roots; many very fine and fine interstitial pores; 10 percent gravel and 5 percent cobbles; neutral (pH 6.8); abrupt wavy boundary.

C1 – 15 to 28 inches; yellowish brown (10YR 5/4) very gravelly coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; many fine, medium and coarse roots; many very fine and fine interstitial pores; 30 percent gravel and 10 percent cobbles; neutral (pH 6.8); abrupt wavy boundary.

C2 – 28 to 60 inches; light brown (7.5YR 6/4) very cobbly coarse sand, brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few medium and coarse roots; many fine interstitial pores; 30 percent gravel and 30 percent cobbles; neutral (pH 6.8).

Type Location: About 1320 feet west and 330 feet south of the northeast corner of the southeast quarter of Section 5, T.1S., R.26E., MDBM, Mono Craters NW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The soil moisture control section is 13 to 60 inches. It is usually dry from mid-April to late November, and is usually moist in some parts the rest of the year. The 10 to 40 inch textural control section is sandy loam, loamy sand, loamy coarse sand, sand, and coarse sand, with 1 to 10 percent clay. Rock fragments are 5 to 45 percent gravel, 0 to 45 percent cobbles, 0 to 40 percent stones, and 0 to 40 percent boulders, and average 38 to 83 percent by volume.

Some pedons are 20 to 40 inches deep to lithic or paralithic contact.

The A horizon has dry color of 10YR 4/3, 5/2, 5/3, 5/4, 6/2 or 6/3; moist color is 10YR 3/2, 3/3, 4/2, 4/3, or 4/4. It is loamy sand, loamy coarse sand or coarse sand, with 1 to 4 percent clay. Rock fragments are 0 to 55 percent gravel, 0 to 15 percent cobbles, 0 to 25 percent stones, and 0 to 15 percent boulders by volume. Reaction is moderately acid to neutral.

The C horizon has dry color of 10YR 5/4, 6/3, 6/4, 7/3 or 7/4, or 7.5YR 6/4, or 5YR 5/3; moist color is 10YR 3/3, 4/3, 4/4, 5/3 or 5/4, or 7.5YR 4/4, or 5YR 3/3. It is sandy loam, loamy sand, loamy coarse sand, sand, or coarse sand, with 1 to 10 percent clay. Rock fragments are 5 to 45 percent gravel, 0 to 45 percent cobbles, 0 to 40 percent stones, and 0 to 40 percent boulders by volume. Reaction is slightly acid to neutral.

XERIC TORRIORTHENTS

These Xeric Torriorthents consist of shallow, somewhat excessively drained soils forming in material weathering from granitic rocks. These soils are on mountainsides, and have slopes of 30 to 60 percent. Elevation is 4,100 to 8,000 feet. The mean annual precipitation is about 4 to 15 inches, and the mean annual temperature is about 49 °F.

Taxonomic Class: Xeric Torriorthents.

Typical Pedon: The representative profile for this soil is on an east-facing mountainside, under blackbrush, buckwheat, spiny horsebrush, Mormon tea and needlegrass, at an elevation of 4,880 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; pale brown (10YR 6/3) very gravelly loamy coarse sand, brown (10YR 4/3) moist; weak fine subangular blocky structure, parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 30 percent gravel and 5 percent cobbles; neutral (pH 7.2); clear smooth boundary.

A2 – 2 to 10 inches; yellowish brown (10YR 5/4) very gravelly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 40 percent gravel and 15 percent cobbles; neutral (pH 7.2); abrupt wavy boundary.

Cr – 10 inches; weathering granitic bedrock, which can be cut with a tilespade.

Type Location: About 660 feet west and 330 feet north of the southwest corner of the northeast quarter of the southeast quarter of Section 10, T.17S., R.36E., MDBM, Olancha NE Quadrangle.

Range in Characteristics: Soil depth to soft bedrock is 9 to 12 inches. The mean annual soil temperature at the paralithic contact is about 53 °F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The textural control section is the whole soil. It is loamy fine sand, loamy sand or loamy coarse sand, with 2 to 6 percent clay. Rock fragments are 10 to 40 percent gravel, 0 to 20 percent cobbles, 0 to 10 percent stones and 0 to 35 percent boulders, and average 37 to 60 percent by volume.

Some pedons have surface horizons with loamy fine sand textures.

The surface A horizon has dry color of 10YR 6/3; moist color is 10YR 4/2 or 4/3. It is loamy sand or loamy coarse sand, with 2 to 4 percent clay. Rock fragments are 20 to 30 percent gravel, 0 to 5 percent cobbles, 0 to 10 percent stones and 0 to 35 percent boulders by volume. Reaction is neutral.

The other A horizons have dry color of 10YR 5/4 or 6/3; moist color is 10YR 4/3 or 4/4. They are loamy fine sand, loamy sand or loamy coarse sand, with 2 to 6 percent clay. Rock fragments are 10 to 40 percent gravel, 0 to 15 percent cobbles, 0 to 10 percent stones and 0 to 35 percent boulders by volume. Reaction is neutral.

XEROFLUVENTS

These Xerofluvents consist of very deep, poorly to very poorly drained soils forming in mixed alluvium. These soils are on floodplains, stream channels and stream terraces, and have slopes of 0 to 5 percent. Elevation is 6,000 to 8,400 feet. The mean annual precipitation is about 6 to 15 inches, and the mean annual temperature is about 45 to 55°F.

Taxonomic Class: Xerofluvents

Typical Pedon: The representative profile for this soil is on a east-facing terrace in a flood plain in Bishop creek, under water birch, red willows, sedges and beardless wildrye, at an elevation of 7,500 feet. Slope is 5 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 6 inches; dark gray (10YR 4/1) sandy loam, black (10YR 2/1) moist; moderate fine granular structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots; common very fine and fine tubular and interstitial pores; 10 percent gravel; neutral (pH 7.0); clear smooth boundary.

A2 – 6 to 11 inches; light brownish gray (10YR 6/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; massive; nonsticky and nonplastic; common very fine and fine roots; common very fine and fine tubular and interstitial pores; 15 percent gravel and 2 percent cobbles; neutral (pH 7.2); abrupt smooth boundary.

A3 – 11 to 18 inches; pale brown (10YR 6/3) gravelly sandy loam, dark brown (10YR 3/3) moist; common prominent (10YR 6/4) iron accumulations lining pores and surrounding roots; massive; nonsticky and nonplastic; common very fine and fine, and few coarse roots; common very fine and fine tubular pores; 15 percent gravel and 2 percent cobbles; slightly alkaline (pH 7.4); abrupt smooth boundary.

C1 – 18 to 32 inches; light gray (5Y 6/1) very gravelly

loam, dark gray (5Y 4/1) moist; common prominent (10YR 6/4) iron accumulations lining pores and surrounding roots; massive; slightly hard, firm, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular pores; 40 percent gravel, 5 percent cobbles and 5 percent stones; neutral (pH 7.2); abrupt smooth boundary.

Cg2 – 32 to 60 inches; greenish gray (5GY 6/1) stratified very gravelly sand and very cobbly sandy clay loam, dark greenish gray (5GY 4/1) moist; loose, very friable, nonsticky and nonplastic; 40 to 50 percent gravel, 5 to 15 percent cobbles and 0 to 10 percent stones; neutral (pH 7.2).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 2,500 feet east and 1,100 feet south of the northwest corner of Section 10, T.7S., R.32E., MDBM, Bishop Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. Depth to the high water table is 12 to 24 inches. Due to the highly variable nature of this soil, it is not necessarily representative of these soils throughout the survey area.

The A horizon has dry color of 10YR 3/1, 4/1, 5/2 or 6/2; moist color is 10YR 2/1, 2/2, 3/2, 4/2 or 4/3. Textures are sandy loam and loam, with 6 to 18 percent clay. Rock fragments are 0 to 15 percent gravel and 0 to 5 percent cobbles, and average 0 to 15 percent by volume.

The C horizon has dry color of 5Y 6/1, or 5GY 6/1, or 10YR 5/1, 6/1, 6/2 or 6/3; moist color is 5Y 4/1, or 5GY 4/1, or 10YR 3/2, 3/3, 4/2 or 5/3. Textures range are sand, loamy sand, sandy loam and sandy clay loam, with 2 to 27 percent clay. Rock fragments are 0 to 50 percent gravel, 0 to 20 percent cobbles and 0 to 5 percent stones, and average 15 to 60 percent by volume.

YELLOWHILLS FAMILY

The Yellowhills family consists of very deep, somewhat excessively drained soils forming in material weathering from pumice, basalt and mixed rocks. These soils are in valley fills, alluvial fans and upland depressions, and have slopes of 2 to 15 percent. Elevation is 6,000 to 8,400 feet. The mean annual precipitation is about 8 to 15 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Ashy, mesic Vitritorrandic Haploxerolls

Typical Pedon: The representative profile for this soil is in a valley fill, under desert bitterbrush, big sagebrush and grasses, at an elevation of 7,120 feet. When described (8/7/87), the soil was dry in the upper 15 inches, and slightly moist in the 15 to 60 inch section. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; grayish brown (10YR 5/2) gravelly coarse sand, very dark gray (10YR 3/1) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine and fine interstitial pores; 20 percent pumice and basalt gravel; moderately acid (pH 6.0); clear smooth boundary.

A2 – 2 to 5 inches; grayish brown (10YR 5/2) gravelly sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 25 percent pumice and basalt gravel; moderately acid (pH 6.0); clear wavy boundary.

C1 – 5 to 15 inches; brown (10YR 5/3) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 15 percent pumice and basalt

gravel; slightly acid (pH 6.5); clear wavy boundary.

C2 – 15 to 60 inches; yellowish brown (10YR 5/4) loamy sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 10 percent pumice and basalt gravel; neutral (pH 7.0).

Type Location: About 5.2 miles east on the Arcularius Ranch Road, from its intersection with Highway 395, then 0.2 mile north on trail, and 30 feet east of the trail; about 660 feet north of the southeast corner of the northeast quarter of Section 28, T.2S., R.28E., MDBM, Mt. Morrison NW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 53°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The 10 to 40 inch textural control section is loamy fine sand or loamy sand, with 2 to 3 percent clay. Rock fragments are 10 to 25 percent gravel, and average 10 to 18 percent by volume. Gravel is mostly pumice, with minor amounts of basalt or mixed gravel.

The A horizon has dry color of 10YR 5/2 or 5/3; moist color is 10YR 3/1 or 3/2. It is sand or coarse sand, with 1 to 3 percent clay. Rock fragments are 10 to 25 percent gravel by volume. The gravel is mostly pumice, with minor amounts of basalt or mixed rock. Reaction is moderately to slightly acid.

The C horizon has dry color of 10YR 5/3, 5/4 or 6/4; moist color is 10YR 3/2 or 3/3. It is loamy fine sand or loamy sand, with 2 to 3 percent clay. Rock fragments are 10 to 25 percent gravel by volume. The gravel is mostly pumice, with minor amounts of basalt or mixed rock. Reaction is slightly acid to neutral.

TABLE 5. - Soil Properties

The results of physical and chemical analyses of selected soils are given in table 5. The data are for soils sampled at carefully selected sites. The pedons are typical of the families and are described in the section "Taxonomic Unit Descriptions". Soil samples were analyzed by the U.S. Department of Agriculture, Soil

Conservation Service, National Soil Survey Laboratory, Lincoln, Nebraska. Most determinations, except those for grain-size analysis, were made on soil material less than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an oven-dry basis.

SOIL CHARACTERIZATION DATA

Map Unit Symbol 134		Soil Classification - Vitrandic Haploxerolls (Inclusion)								Pedon No-86P 975		Soil Survey ID No. -S86CA-051-002				(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight				
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75	
0-8	A1	0.6	5.8	93.6	2.9	2.9	5.1	12.6	15.7	25.1	35.1	14	2	--	90	16
8-25	A2	0.8	15.0	84.2	8.0	7.0	8.6	21.7	24.2	17.4	12.3	14	7	--	81	21
25-46	C1	2.0	11.5	86.5	7.5	4.0	7.6	22.5	24.1	18.4	13.9	15	6	--	83	21
46-71	C2	2.0	19.0	79.0	12.3	6.7	7.5	17.4	19.1	19.6	15.4	13	5	--	77	18
71-94	2A1B	2.1	14.7	83.2	9.4	5.3	9.5	21.7	22.3	17.0	12.7	12	6	--	78	18
94-109	2AB2	2.2	15.5	82.3	9.4	6.1	11.2	25.3	24.0	14.3	7.5	9	8	--	76	17
109-152	2C	3.5	16.2	80.3	9.2	7.0	14.5	24.0	19.8	13.8	8.2	12	11	--	74	27
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay	
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al
0-8	A1	0.62	0.053			1.9	0.2	TR	0.2	2.3	1.2		3.5	3.0		
8-25	A2	0.59	0.047			2.5	0.3	0.1	0.5	3.4	0.9		4.3	3.4		
25-46	C1	0.27	0.030			2.0	0.2	TR	0.2	2.4	0.5		2.9	2.5		1.25
46-71	C2	0.22	0.021			1.8	0.2	TR	0.2	2.2	0.5		2.7	2.1		1.05
71-94	2A1B	0.21	0.023			1.8	0.3	TR	0.2	2.3	0.3		2.6	2.6		1.24
94-109	2AB2	0.23	0.024			2.6	0.2	0.1	0.2	3.1	0.5		3.6	2.7		1.23
109-152	2C	0.17	0.021			2.6	0.5	0.2	0.1	3.4	0.3		3.7	3.5		1.00
DITH-CIT-Extractable (all depths) FE-0.1, 0.1, 0.1, 0.1, 0.1, 0.2, 0.2, 0.2 & AL-TR, TR, TR, TR, TR, TR, TR																
BULK DENSITY (depths levels 2, 3, 7) 1/3 Bar 4A1D-1.11, 1.17, 1.53 & oven dry 4A1H-1.16, 1.23, 1.54 & Whole Soil 4D1-0.011, 0.013, 0.001 & WATER CONTENT - 1/3 Bar 4B1C-18.7, 27.5, 16.1																

Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/ Clay %	
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al					
0-8	A1		66	77	7.4	5.0	6.3	0.03	0.05	0.00	0.00	59		8.1		
8-25	A2		79	100	7.7	5.5	6.1	0.03	0.06	0.00	0.01	59		5.3		
25-46	C1		83	96	7.7	5.5	6.5	0.02	0.03	0.00	0.01	60		4.9	2.45	
46-71	C2		81	100	7.7	5.6	6.5	0.01	0.01	0.00	0.01	59		3.7	1.85	
71-94	2A1B		88	88	7.6	5.7	6.5	0.02	0.03	0.00	0.01	59		3.9	1.86	
94-109	2AB2		86	100	7.7	5.7	6.6	0.02	0.01	0.00	0.01	59		3.7	1.68	
109-152	2C		92	97	7.7	5.9	6.9	0.02	0.02	0.00	0.01	58		3.5	1.00	

Depth (cm)	Horizon	Clay Fraction X-Ray Minerals	Clay Fraction Oxides (%)			Silt & Sand (%)							Clay (%)		
			Al ₂ O ₃	Fe ₂ O ₃	K ₂ O	Fractiona- tion	Total Retained	Grain Count (%)					Fine	CO ₂	
0-8	A1	X-RAY= M11/CR1/THERMAL= ----		1.4	0.6	VFS		GS84	OT14	GA2					
8-25	A2					VFS		GS73	OT19	GA8					
25-46	C2	X-RAY=M11, KK1, CR1/TH.=KK9		1.7	0.9	VFS		GS75	OT21	GA4					
71-94	2A1B					CSi		GS84	OT15	GA2					
94-109	2AB2	X-RAY=KK2,M11,CR1/TH.=KK43		4.1	0.9	VFS		GS78	OT17	GA5					
109-152	2C					VFS		GS60	OT25	GA15					
						VFS		GS58	OT27	GA15					
							</								

SUPPLEMENTAL CHARACTERIZATION DATA																										
Map Unit 134			Soil Classification - Vitrandic Haploxerolls (Inclusion)														Pedon No -86P 975				NCSS Sample No					
Soil Survey -S86CA-051-002			Laboratory														Sample Date									
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve												Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at									Atterberg (pct)		Gradation	
		Inches						Number			Microns			Millimeter					Percentile							
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10	LL	PI	unifmty.	curvtur
0-3	A1	100	100	100	100	100	99	98	84	30	8	3	1	1	55	33	20	10	5	1.14	0.862	0.103			11.0	1.5
3-10	A2	100	100	100	100	100	97	93	79	51	16	7	3	1	69	56	36	19	12	0.63	0.409	0.033			18.9	1.5
10-18	C1	100	100	100	100	100	97	94	79	49	14	8	4	2	68	53	34	17	11	0.68	0.440	0.041			16.5	1.4
18-28	C2	100	100	100	100	100	98	95	82	49	21	12	6	2	69	53	38	23	17	0.67	0.432	0.013			49.5	2.6
28-37	2A1B	100	100	100	100	100	97	94	82	53	18	9	5	2	72	58	39	22	14	0.56	0.374	0.023			24.9	1.9
37-43	2AB2	100	100	100	100	100	96	92	83	60	20	10	5	2	77	65	45	24	15	0.42	0.298	0.021			19.7	1.9
43-60	2C	100	100	100	100	100	95	89	77	56	21	10	6	3	71	60	45	26	15	0.50	0.316	0.021			24.0	1.4
Depth (in)	Horizon	Weight Fractions												Weight Per Unit Volume G/CC										Void Ratios		
		Whole Soil (mm)								<75 mm Fraction				Whole Soil Soil Survey Engineering				<2mm Fracton Soil Survey Engineering at 1/3 Bar								
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moi-st	Sat-urated	1/3 Bar	15 Bar	Oven Dry	Moist	Sat-urated	Whl Soil	Bar <2 mm	
0-3	A1	16	--	--	16	--	2	14	84	16	--	2	14	84	1.56											
3-10	A2	21	--	--	21	--	7	14	79	21	--	7	14	79	1.09	1.12	1.25	1.00	1.11	1.15	1.16	1.32	1.00			
10-18	C1	21	--	--	21	--	6	15	79	21	--	6	15	79	1.13	1.17	1.38	1.00	1.17	1.22	1.23	1.49	1.00			
18-28	C2	18	--	--	18	--	5	13	82	18	--	5	13	82	1.58											
28-37	2A1B	18	--	--	18	--	6	12	82	18	--	6	12	82	1.58											
37-43	2AB2	17	--	--	17	--	8	9	83	17	--	8	9	83	1.57											
43-60	2C	25	2	--	23	--	11	12	75	23	--	11	12	77	1.36	1.36	1.52	1.00	1.53	1.54	1.54	1.78	1.00			

Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil													C/N Rat- io	Ratios to Clay 2mm Fraction				Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)											
		>2	250- up	250- 75	75-2	75- 20	20- 5	5-2	<2	2- .05	.05- .002	LT .002	Pores D F	Fine Clay		CEC		-15 Bar H ₂ O	LE 1/3 Bar	Whole Soil		<2mm													
																Sum CATS	NH ₄ OAc			-15 Bar	Oven Dry	-15 Bar	Oven Dry	Whole Soil	<2mm										
0-3	A1	9	--	--	9	--	1	8	91	46	3		41		12		5.83	5.00	13.50																
3-10	A2	23	--	--	23	--	8	15	77	27	5			15	13		5.38	4.25	6.63	1.875	0.6	0.9	1.2	1.5	0.12	0.15									
10-18	C1	24	--	--	24	--	7	17	76	29	4	1		24	9		1.45	1.25	2.45	0.850	0.9	1.2	1.4	1.7	0.20	0.26									
18-28	C2	11	--	--	11	--	3	8	89	38	9	1	40		11		1.35	1.05	1.85																
28-37	2A1B	11	--	--	11	--	4	7	89	40	7	1	40		9		1.24	1.24	1.86																
37-43	2AB2	10	--	--	10	--	5	5	90	41	8	1	41		10		1.64	1.23	1.68																
43-60	2C	34	3	--	31	--	15	16	66	31	6	1		15	8		1.06	1.00	1.00	0.057			0.2	0.2	0.13	0.19									
Depth (in)	Horizon	Weight Fraction - Clay Free													Texture Determined <2mm	PSDA (mm) Pct of 2mm			<2mm Electrical				Whole Soil												
		Whole Soil Pct. of >2mm + Sand + Silt						<2mm Fraction / Pct of Sand + Silt																											
		>2	75-2	20-2	2- .05	.05- .002	LT .002	Sands					Silt		Clay										In field	By PSDA	Sand 2-.05	Silt .05- .002	Clay LT .002	PH Ca-Cl ₂ .01M	Re- sist OHMS	Con- duct Mmhos	Cumult. Amounts Salt inch of H ₂ O		
								VC	C	M	F	VF	C	F			MG/ KG	1/3 Bar to 15 Bar Airdry																	
0-3	A1	16	16	16	79	5	1	35	25	16	13	5	3	3	1	S	COS	93.6	5.8	0.6	5.0														
3-10	A2	21	21	21	67	12	1	12	18	24	22	9	7	8	1	COS	LCOS	84.2	15.0	0.8	5.5														
10-18	C1	21	21	21	69	9	2	14	19	25	23	8	4	8	2	COS	COS	86.5	11.5	2.0	5.5														
18-28	C2	18	18	18	66	16	2	16	20	19	18	8	7	13	2	COS	LCOS	79.0	19.0	2.0	5.6														
28-37	2A1B	18	18	18	69	12	2	13	17	23	22	10	5	10	2	COS	LCOS	83.2	14.7	2.1	5.7														
37-43	2AB2	17	17	17	70	13	2	8	15	25	26	11	6	10	2	S	LS	82.3	15.5	2.2	5.7														
43-60	2C	26	24	24	62	12	3	8	14	21	25	15	7	10	4	S	LS	80.3	16.2	3.5	5.9														

SOIL CHARACTERIZATION DATA

Map Unit Symbol 146			Soil Classification- Brantel Family							Pedon No-86P 976			Soil Survey ID No. -S86CA-051-003					(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight						
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75			
0-8	A1	1.4	7.6	91.0	3.7	3.9	7.1	13.4	17.5	30.2	22.8	10	2	2V	86	14		
8-23	A2	2.3	18.6	79.1	10.9	7.7	10.7	15.7	18.0	20.5	14.2	11	3	--	73	14		
23-64	2C1	1.2	6.3	92.5	2.2	4.1	11.0	20.8	20.7	21.2	18.8	20	9	--	87	29		
64-102	3C2	2.1	13.8	84.1	10.1	3.7	2.2	5.7	15.6	31.7	28.9	17	4	--	86	21		
102-114	4C3	2.0	20.4	77.6	12.5	7.9	10.0	13.8	14.3	17.0	22.5	--	--	--	68	--		
114-135	5C4	2.1	12.8	85.1	9.8	3.0	5.0	13.2	17.5	24.0	25.4	15	11	--	85	26		
135-150	6C5	0.7	1.8	97.5	1.3	0.5	2.7	10.5	20.3	34.7	29.3	27	32	1	98	60		
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay			
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al		
0-8	A1	0.49	0.034			1.2	0.2	TR	0.2	1.6	0.9		2.5	2.2		1.57		
8-23	A2	0.17	0.012			1.0	0.2	0.1	0.1	1.4	0.7		2.1	1.9		0.83		
23-64	2C1	0.04	0.002			0.9	0.1	TR	TR	1.0	--		1.0	1.2		1.00		
64-102	3C2	0.01	0.003			0.4	0.1	0.1	TR	0.6	0.1		0.7	0.8		0.38		
102-114	4C3	0.32	0.001			1.1	0.5	0.4	0.2	2.2	--		2.2	2.1		1.05		
114-135	5C4	0.03	--			0.6	0.3	0.3	TR	1.2	--		1.2	1.3		0.62		
135-150	6C5	0.03	0.006			0.4	0.1	0.2	--	0.7	--		0.7	0.9				

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit 146		Soil Classification - Brantel Family														Pedon No -86P 976				NCSS Sample No							
Soil Survey -S86CA-051-003		Laboratory														Sample Date											
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve													Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at							Atterberg (pct)		Gradation			
		Inches						Number				Microns			Millimeter				Percentile								
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10	LL	PI	unifmty.	curvtur	
0-3	A1	100	99	99	98	98	97	96	87	37	11	4	2	1	67	41	26	14	8	0.83	0.636	0.064			13.0	1.8	
3-9	A2	100	100	100	100	100	99	97	86	52	23	11	6	2	74	56	41	27	18	0.58	0.380	0.014			40.5	1.8	
9-25	2C1	100	100	100	100	100	96	91	71	39	10	2	1	1	58	43	28	13	5	1.13	0.703	0.076			14.9	0.9	
25-40	3C2	100	100	100	100	100	98	96	79	28	14	10	5	2	56	31	19	14	13	1.12	0.843	0.022			50.1	8.8	
4-45	4C3	100	100	100	100	100	100	100	100	57	28	15	7	2	78	61	46	32	22	0.49	0.301	0.009			55.9	1.7	
45-53	5C4	100	100	100	100	100	95	89	74	34	13	9	4	2	55	37	24	15	11	1.19	0.816	0.033			36.5	2.9	
53-59	6C5	100	100	100	99	99	83	67	40	12	2	1	TR	TR	28	14	6	2	1	3.77	2.745	0.343			11.0	0.9	
Depth (in)	Horizon	Weight Fractions													Weight Per Unit Volume G/CC										Void Ratios		
		Whole Soil (mm)								<75 mm Fraction					Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar								
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moi-st	Sat-urated	1/3 Bar	15 Bar	Oven Dry	Moist	Sat-urated	Whl Soil	Bar <2 mm		
0-3	A1	13	--	--	13	2	2	9	87	13	2	2	9	87	1.54												
3-9	A2	14	--	--	14	--	3	11	86	14	--	3	11	86	1.41	1.41	1.52	1.00	1.50	1.50	1.50	1.64	1.00				
9-25	2C1	29	--	--	29	--	9	20	71	29	--	9	20	71	1.67												
25-40	3C2	21	--	--	21	--	4	17	79	21	--	4	17	79	1.38	1.41	1.50	1.00	1.54	1.57	1.58	1.71	1.00				
40-45	4C3	--	--	--	--	--	--	--	100	--	--	--	--	100	1.45												
45-53	5C4	26	--	--	26	--	11	15	74	26	--	11	15	74	1.38	1.39	1.49	1.00	1.58	1.60	1.60	1.74	1.00				
53-59	6C5	60	--	--	60	1	32	27	40	60	1	32	27	40	1.99												

Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil														C/N Rat- io	Ratios to Clay 2mm Fraction				Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)	
		>2	250- up	250- 75	75-2	75- 20	20- 5	5-2	<2	2- .05	.05- .002	LT .002	Pores D F		Fine Clay		CEC		-15 Bar H ₂ O	LE 1/3 Bar	Whole Soil		<2mm			
																	Sum CATS	NH ₄ OAc			-15 Bar	Oven Dry	-15 Bar	Oven Dry	Whole Soil	<2mm
0-3	A1	8	--	--	8	1	1	5	92	46	4	1	42		15		1.86	1.57	2.93							
3-9	A2	20	--	--	20	--	4	16	80	37	9	1		10	14		0.91	0.83	1.13						0.08	0.10
9-25	2C1	18	--	--	18	--	6	13	82	41	3	1	37		19		0.83	1.00	3.92							
25-40	3C2	29	--	--	29	--	6	24	71	35	6	1		11	4		0.33	0.38	0.86	0.429	0.7	0.7	0.6	0.9	0.10	0.15
40-45	4C3	--	--	--	--	--	--	--	100	42	11	1	45		317		1.10	1.05	0.80							
45-53	5C4	36	--	--	36	--	15	21	64	33	5	1		10			0.57	0.62	0.86	0.190	0.2	0.2	0.4	0.4	0.09	0.14
53-59	6C5	44	--	--	44	1	24	20	56	29	1		25		5		1.00	1.29	5.00							
Depth (in)	Horizon	Weight Fraction - Clay Free														Texture Determined <2mm		PSDA (mm) Pct of 2mm			<2mm Electrical				Whole Soil	
		Whole Soil Pct. of >2mm + Sand + Silt						<2mm Fraction / Pct of Sand + Silt																		
		>2	75-2	20-2	2- .05	.05- .002	LT .002	Sands					Silts		Clay	In field	By PSDA	Sand 2-.05	Silt .05- .002	Clay LT .002	PH CA-Cl ₂ .01M	Re- sist OHMS	Con- duct Mmhos	Cumult. Amounts Salt inch of H ₂ O		
								VC	C	M	F	VF	C	F										MG/ KG	1/3 Bar to 15 Bar Airdry	
0-3	A1	13	13	11	80	7	1	23	31	18	14	7	4	4	1	COS	COS	91.0	7.6	1.4	5.0					
3-9	A2	14	14	14	69	16	2	15	21	18	16	11	8	11	2	COS	LCOS	79.1	18.6	2.3	4.9					
9-25	2C1	29	29	29	66	5	1	19	21	21	21	11	4	2	1	COS	COS	92.5	6.3	1.2	5.5					
25-40	3C2	21	21	21	68	11	2	30	32	16	6	2	4	10	2	COS	LCOS	84.1	13.8	2.1	5.5					
40-45	4C3				79	21	2	23	17	15	14	10	8	13	2		LCOS	77.6	20.4	2.0	7.2					
45-53	5C4	26	26	26	64	10	2	26	25	18	13	5	3	10	2	COS	LCOS	85.1	12.8	2.1	6.1					
53-59	6C5	60	60	59	36	1	TR	30	35	20	11	3	1	1	1		COS	97.5	1.8	0.7	6.1					

SOIL CHARACTERIZATION DATA

Map Unit Symbol 146		Soil Classification - Lakash Family								Pedon No-86P 977		Soil Survey ID No. -S86CA-051-004				(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight				
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75	
0-3	A1	1.6	6.2	92.2	2.6	3.6	14.2	23.2	19.8	18.3	16.7	14	12	2V	84	28
3-13	A2	1.6	12.2	86.2	4.9	7.3	12.4	21.3	19.4	17.1	16.0	15	36	2	88	53
13-18	C1	2.2	13.3	84.5	5.7	7.6	13.5	25.5	20.9	13.9	10.7	11	10	2	78	23
18-30	C2	1.4	8.5	90.1	3.7	4.8	12.8	24.8	22.2	16.5	13.8	18	9	--	83	27
30-43	2C3	1.8	9.3	88.9	5.7	3.7	10.9	20.5	22.3	20.7	14.5	12	6	--	82	18
43-84	3C4	1.3	5.0	93.7	2.2	2.8	9.0	20.8	20.2	20.0	23.7	16	10	--	89	26
84-117	4C5	1.0	2.7	96.3	0.9	1.8	6.8	21.9	21.4	20.8	25.4	20	29	1	95	50
117-142	5C6	2.3	16.1	81.6	11.8	4.3	3.0	8.4	16.9	26.8	26.5	21	9	--	85	30
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay	
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al
0-3	A1	0.67	0.038			1.5	0.4	0.1	0.2	2.2	0.9		3.1	2.3		1.44
3-13	A2	0.52	0.034			1.9	0.3	0.1	0.1	2.4	0.2		2.6	2.5		1.56
13-18	C1	0.17	0.012			1.7	0.4	0.1	0.1	2.3	--		2.3	2.2		1.00
18-30	C2	0.06	0.004			1.2	0.3	0.1	0.1	1.7	--		1.7	1.9		1.36
30-43	2C3	0.04	0.002			1.4	0.4	0.1	TR	1.9	--		1.9	2.0		1.11
43-84	3C4	0.08	0.002			0.9	0.3	0.2	TR	1.4	--		1.4	1.6		1.23
84-117	4C5	0.06	0.001			0.4	0.1	0.6	TR	1.1	0.1		1.2	1.0		1.00
117-142	5C6	0.03	0.001			0.4	TR	0.8	0.1	1.3	--		1.3	1.0		0.43
DITH-CIT - Extractable (all depths) FE 6C2B-0.1, 0.1, 0.2, 0.1, 0.1, 0.1, 0.1, 0.1 & AL 6G7a-TR, TR, TR, TR, TR, TR, TR, TR																
BULK DENISTY (depths 3, 5) 1/3 Bar 4A1D-1.49, 1.50 & oven dry 4A1H-1.49, 1.50 & Water Content 1/3 Bar 4B1C-7.1, 7.1 & Cole Whole Soil 4D1- --, --																

Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/ Clay %	
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al					
0-3	A1		71	96	7.7	5.3	6.1	0.02	0.00	0.00	0.00			4.6	2.88	
3-13	A2		92	96	7.5	5.5	6.3	0.02	0.00	0.00	0.00			5.6	3.50	
13-18	C1		100	100	7.5	5.7	6.5	0.01	0.00	0.00	0.00			3.0	1.36	
18-30	C2		100	89	7.6	5.8	6.6	0.01	0.00	0.00	0.00			3.1	2.21	
30-43	2C3		100	95	7.5	5.8	6.7	0.01	0.00	0.00	0.00			2.1	1.17	
43-84	3C4		100	88	7.5	5.7	6.7	0.02	0.00	0.00	0.00			3.9	3.00	
84-117	4C5		92	100	7.5	6.6	7.5	0.02	0.00	0.00	0.00			8.5	8.50	
117-142	5C6		100	100	7.6	8.7	9.6	0.01	0.00	0.00	0.00			1.4	0.61	
Depth	Horizon	Clay Mineralogy (.022 mm)							Sand - Silt Mineralogy (2.0 - 0.002 mm)							
		Fraction	X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent					
				DSC	TGA						Thermal (%)		Total Retain.	Optical Grain Count 7Bla		
				7A6	7A4b	Al ₂ O ₃	Fe ₂ O ₃	K ₂ O			DTA 7A3b	TGA 7A4b				
0-3	A1	TCLY	MI 1	KK 2				2.7	0.6	VFS						GS62, OT36, GA 2
3-13	A2									VFS						GS77, OT23, GA 1
13-18	C1	TCLY	MI 1, MT 2	KK 2				6.4	1.3	VFS						GS57, OT41, GA 2
18-30	C2									VFS						GS63, OT36, GA 2
30-43	2C3	TCLY	MI1,MT1, KK1	KK 8				4.1	1.0	VFS						GS57, OT41, GA 2
43-84	3C4															
84-117	4C5															
117-142	5C6	TCLY	KK 2, CR 1	KK20				1.3	1.8	VFS						GS84, OT13, GA 3
CaCO ₃ <2MM - (depth 8) - 1																
(all depths) KOH-0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 HUMIC COLOR-0.0, 0.0, 0.0, 1.3, 0.0, 0.0, 0.0, 0.0 HCL-HF COLOR 0.05, 0.04, 0.07, 0.02, 0.05, 0.06, 0.05, 0.04																

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit 146		Soil Classification - Lakash Family														Pedon No -86P 977					NCSS Sample No						
Soil Survey -S86CA-051-004		Laboratory														Sample Date											
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve													Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at									Atterberg (pct)		Gradation	
		Inches						Number				Microns			Millimeter					Percentile							
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10	LL	PI	unifmty.	curvtur	
0-1	A1	100	99	99	98	98	93	87	73	44	12	3	2	1	61	47	33	16	6	0.96	0.571	0.067			14.4	0.7	
1-5	A2	100	99	99	98	98	80	62	47	29	10	3	2	1	39	31	22	12	6	4.19	2.373	0.076			55.2	0.6	
5-7	C1	100	99	99	98	98	93	88	77	54	18	6	3	2	69	58	42	22	12	0.57	0.353	0.037			15.4	1.0	
7-12	C2	100	100	100	100	100	96	91	73	47	13	4	2	1	63	51	35	17	7	0.85	0.482	0.061			13.8	0.8	
12-17	2C3	100	100	100	100	100	97	94	82	49	14	6	3	1	70	53	35	18	9	0.66	0.444	0.054			12.3	1.0	
17-33	3C4	100	100	100	100	100	95	90	74	38	8	3	2	1	56	42	27	11	5	1.15	0.739	0.087			13.2	0.8	
33-46	4C5	100	100	100	99	99	85	70	50	24	4	1	1	1	37	27	16	5	2	3.07	2.000	0.149			20.6	0.8	
46-56	5C6	100	100	100	100	100	96	91	70	30	14	10	5	2	51	33	21	15	13	1.38	0.948	0.021			66.2	6.4	
Depth (in)	Horizon	Weight Fractions													Weight Per Unit Volume G/CC										Void Ratios		
		Whole Soil (mm)								<75 mm Fraction					Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar								
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moi-st	Sat-urated	1/3 Bar	15 Bar	Oven Dry	Moist	Sat-urated	Whl Soil	Bar <2 mm		
0-1	A1	27	--	--	27	2	11	14	73	27	2	11	14	73	1.65												
1-5	A2	53	--	--	53	2	36	15	47	53	2	36	15	47	1.91												
5-7	C1	23	--	--	23	2	10	11	77	23	2	10	11	77	1.34	1.34	1.41	1.00	1.49	1.49	1.49	1.60	1.00				
7-12	C2	27	--	--	27	--	9	18	73	27	--	9	18	73	1.65												
12-17	2C3	18	--	--	18	--	6	12	82	18	--	6	12	82	1.38	1.38	1.46	1.00	1.50	1.50	1.50	1.61	1.00				
17-33	3C4	26	--	--	26	--	10	16	74	26	--	10	16	74	1.64												
33-46	4C5	50	--	--	50	1	29	20	50	50	1	29	20	50	1.86												
46-56	5C6	30	--	--	30	--	9	21	70	30	--	9	21	70	1.68												

Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil														C/N Rat- io	Ratios to Clay 2mm Fraction				Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)	
		>2	250- up	250- 75	75-2	75- 20	20- 5	5-2	<2	2- .05	.05- .002	LT .002	Pores D F		Fine Clay		CEC		-15 Bar H ₂ O	LE 1/3 Bar	Whole Soil		<2mm			
																	Sum CATS	NH ₄ OAc			-15 Bar	Oven Dry	-15 Bar	Oven Dry		
																									Whole Soil	<2mm
0-1	A1	17	--	--	17	1	7	9	83	43	3	1	38		18		1.94	1.44	2.88							
1-5	A2	38	--	--	38	1	26	11	62	30	4	1	28		15		1.63	1.56	3.50							
5-7	C1	31	--	--	31	3	13	15	69	33	5	1		6	14		1.05	1.00	1.36						0.04	0.06
7-12	C2	17	--	--	17	--	6	11	83	41	4	1	38		14		1.21	1.36	2.21							
12-17	2C3	25	--	--	25	--	8	16	75	38	4	1		7	19		1.06	1.11	1.17						0.06	0.08
17-33	3C4	16	--	--	16	--	6	10	84	43	2	1	38		38		1.08	1.23	3.00							
33-46	4C5	35	--	--	35	1	20	14	65	34	1		30		57		1.20	1.00	8.50							
46-56	5C6	19	--	--	19	--	6	13	81	36	7	1	37		26		0.57	0.43	0.61							
Depth (in)	Horizon	Weight Fraction - Clay Free														Texture Determined <2mm		PSDA (mm) Pct of 2mm			<2mm Electrical				Whole Soil	
		Whole Soil Pct. of >2mm + Sand + Silt						<2mm Fraction / Pct of Sand + Silt																		
		>2	75-2	20-2	2- .05	.05- .002	LT .002	Sands					Silts		Clay	In field	By PSDA	Sand 2-.05	Silt .05- .002	Clay LT .002	PH CA-CL ₂ .01M	Re- sist OHMS	Con- duct Mmhos	Cumult. Amounts Salt inch of H ₂ O		
								VC	C	M	F	VF	C	F										MG/ KG	1/3 Bar to 15 Bar Airdry	
0-1	A1	27	27	25	68	5	1	17	19	20	24	14	4	3	2	S	COS	92.2	6.2	1.6	5.3					
1-5	A2	53	53	51	41	6	1	16	17	20	22	13	7	5	2	COS	COS	86.2	12.2	1.6	5.5					
5-7	C1	23	23	21	66	10	2	11	14	21	26	14	8	6	2	COS	LS	84.5	13.3	2.2	5.7					
7-12	C2	27	27	27	66	6	1	14	17	23	25	13	5	4	1	COS	COS	90.1	8.5	1.4	5.8					
12-17	2C3	18	18	18	74	8	1	15	21	23	21	11	4	6	2	COS	COS	88.9	9.3	1.8	5.8					
17-33	3C4	26	26	26	70	4	1	24	20	20	21	9	3	2	1	COS	COS	93.7	5.0	1.3	5.7					
33-46	4C5	50	50	49	48	1	1	26	21	22	22	7	2	1	1	COS	COS	96.3	2.7	1.0	6.6					
46-56	5C6	30	30	30	58	11	2	27	27	17	9	3	4	12	2	COS	LCOS	81.6	16.1	2.3	8.7					

SOIL CHARACTERIZATION DATA	
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Map Unit Symbol		126	Soil Classification- Vitandic Xerorthents, pumiceous							Pedon No-86P 978		Soil Survey ID No. -S86CA-051-005				(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight				
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75	
0-5	A1	2.3	17.6	80.1	9.5	8.1	15.6	21.6	17.7	15.0	10.2	12	10	--	72	22
5-25	A2	1.8	17.7	80.5	9.2	8.5	15.7	22.8	18.2	13.9	9.9	11	12	--	73	23
25-36	BW	1.7	20.6	77.7	12.0	8.6	9.9	17.9	18.2	17.5	14.2	18	18	1	80	37
36-81	2C1	1.8	11.8	86.4	6.8	5.0	4.1	8.1	12.7	24.1	37.4	29	25	TR	92	54
81-84	3C2	1.0	26.8	72.2	13.2	13.6	19.6	26.3	11.1	9.2	6.0	7	4	--	58	11
84-152	4C3	0.9	23.0	76.1	12.2	10.8	14.3	24.6	17.3	12.3	7.6	6	3	1	66	10
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay	
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al
0-5	A1	2.30	0.069			4.8	0.9	0.1	0.4	6.2	6.2		12.4	8.9		3.87
5-25	A2	0.86	0.031			3.9	0.6	0.1	0.3	4.9	3.6		8.5	6.4		3.56
25-36	BW	0.24	0.010			1.6	0.6	TR	0.2	2.4	1.4		3.8	3.5		2.06
36-81	2C1	0.07	0.003			1.2	0.4	0.1	0.2	1.9	0.7		2.6	2.5		1.39
81-84	3C2	0.45	0.016			1.6	0.2	TR	0.1	1.9	1.8		3.7	3.2		3.20
84-152	4C3	0.40	0.020			1.4	0.2	TR	0.1	1.7	3.2		4.9	3.2		

Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/ Clay %	
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al					
0-5	A1		50	70	8.2	5.0	5.8	0.18	0.23	0.01	0.07	58		5.2	2.26	
5-25	A2		58	77	9.4	5.2	6.0	0.10	0.20	0.03	0.09	59		3.9	2.17	
25-36	BW		63	69	9.2	5.3	6.2	0.04	0.28	0.04	0.05	61		2.9	1.71	
36-81	2C1		73	76	8.2	5.2	6.1	0.04	0.18	0.03	0.02	58		2.9	1.61	
81-84	3C2		51	59	9.2	5.2	6.0	0.05	0.04	0.01	0.05	59		1.9	1.90	
84-152	4C3		35	53	10.0	5.3	6.1	0.04	0.04	0.07	0.17	59		2.3	2.56	
Depth	Horizon	Clay Mineralogy (.022 mm)							Sand - Silt Mineralogy (2.0 - 0.002 mm)							
		Fraction	X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent					
				DSC	TGA						Thermal (%)		Total Retain.	Optical Grain Count 7Bla		
				7A6	7A4b	Al ₂ O ₃	Fe ₂ O ₃	K ₂ O			DTA 7A3b	TGA 7A4b				
				0-5	A1										VFS	
5-25	A2	TCLY	*	KK 2	KKtr		3.1	0.7	VFS						GS52, OT33, GA15	
25-36	BW								VFS						GS50, OT43, GA 7	
36-81	2C1	TCLY	*	KK10			4.1	1.3	VFS						GS57, OT29, GA14	
81-84	3C2								VFS						GS89, OT 7, GA 4	
84-152	4C3	TCLY	*	KKtr			2.7	0.8	VFS						GS78, OT20, GA 2	
* X-RAY 7A2i (depths 2, 4, 6) TCLY, TCLY, TCLY																
(all depths) KOH AL-0.1, 0.1, 0.0, 0.0, 0.1, 0.2 & HUMIC COLOR-0.00, 0.00, 0.00, 0.00, 0.00, 0.00 & HCL-HF COLOR-0.17, 0.13, 0.08, 0.04, 0.08, 0.09																
WATER CONTENT (depths 2, 3, 5) 1/3 BAR 4B1C-28.0, 35.3, 13.7																

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit 126		Soil Classification - Vitrandic Xerorthents, pumiceous														Pedon No - 86P 978					NCSS Sample No						
Soil Survey- S86CA-051-005		Laboratory														Sample Date											
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve												Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at									Atterberg (pct)		Gradation		
		Inches						Number			Microns			Millimeter					Percentile								
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10	LL	PI	unifmty.	curvtur	
0-2	A1	100	100	100	100	100	95	90	78	55	22	9	5	2	70	58	45	28	16	0.55	0.329	0.022			24.6	1.0	
2-10	A2	100	100	100	100	100	94	88	77	55	22	8	4	1	69	59	45	27	15	0.54	0.326	0.025			22.0	1.0	
10-14	BW	100	100	100	99	99	90	81	63	40	18	9	4	1	54	43	32	20	14	1.59	0.775	0.025			62.9	1.2	
14-32	2C1	100	100	100	100	100	88	75	46	16	7	4	2	1	29	18	12	8	6	3.02	2.250	0.158			19.1	2.3	
32-33	3C2	100	100	100	100	100	98	96	89	73	35	13	6	1	84	75	66	42	25	0.20	0.136	0.012			16.8	1.6	
33-60	4C3	100	100	100	99	99	98	96	90	68	29	12	5	1	83	72	57	34	22	0.29	0.191	0.014			21.2	1.6	
Depth (in)	Horizon	Weight Fractions												1829Weight Per Unit Volume G/CC										Void Ratios			
		Whole Soil (mm)								<75 mm Fraction				Whole Soil8475 Soil Survey Engine83e72ring				<2mm Fraction Soil Survey Engineering at 1/3 Bar									
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moist	Saturated	1/3 Bar	15 Bar	Oven Dry	Moist	Saturated	Whl Soil	Bar <2 mm		
0-2	A1	22	--	--	22	--	10	12	78	22	--	10	12	78	1.62												
2-10	A2	23	--	--	23	--	12	11	77	23	--	12	11	77	0.99	1.02	1.21	1.00	0.99	1.02	1.02	1.27	1.00	0.01	0.01		
10-14	BW	37	--	--	37	1	18	18	63	37	1	18	18	63	1.75												
14-32	2C1	54	--	--	54	TR	25	29	46	54	TR	25	29	46	0.92	1.02	1.07	1.00	0.84	1.02	1.04	1.14	1.00	0.09	0.19		
32-33	3C2	11	--	--	11	--	4	7	89	11	--	4	7	89	1.53												
33-60	4C3	10	--	--	10	1	3	6	90	10	1	3	6	90	1.23	1.24	1.38	1.00	1.27	1.28	1.28	1.44	1.00				

SOIL CHARACTERIZATION DATA																		
Map Unit Symbol 140, 144		Soil Classification- Cozetica Family						Pedon No-86P 979		Soil Survey ID No. -S86CA-051-006				<div>(>2MM) Wt. % of Whole Soil</div>				
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight						
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20				20-75	.1-75
0-5	A1	0.6	7.5	91.9	3.1	4.4	12.3	35.1	20.2	12.7	11.6	19	15	7	88	41		
5-15	A2	0.4	9.9	89.7	5.6	4.3	8.8	40.8	21.8	9.4	8.9	14	12	--	86	26		
15-41	C1	0.8	15.1	84.1	8.7	6.4	11.6	25.9	22.5	15.3	8.8	9	4	1	76	14		
41-61	2AB	0.2	3.4	96.4	1.0	2.4	5.7	15.8	20.0	25.0	29.9	17	8	--	93	25		
61-91	2C2	1.1	9.4	89.5	4.1	5.3	9.6	20.1	18.7	17.9	23.2	22	20	--	88	42		
91-107	3C3	0.7	5.5	93.8	1.7	3.8	10.6	23.6	21.6	19.3	18.7	13	9	2	87	24		
107-152	4C4	0.6	3.4	96.0	0.6	2.8	11.7	20.0	20.2	20.7	23.4	22	19	8	92	49		
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay			
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al		
0-5	A1	1.23	0.079			2.8	0.3	TR	0.2	3.3	1.3		4.6	3.2				
5-15	A2	0.54	0.042			2.3	0.4	TR	0.2	2.9	0.2		3.1	2.6				
15-41	C1	0.15	0.016			1.5	0.4	TR	0.2	2.1	0.7		2.8	2.0				
41-61	2AB	0.02	0.007			0.5	0.1	TR	--	0.6	0.2		0.8	0.9				
61-91	2C2	0.12	0.010			1.5	0.5	0.1	TR	2.1	0.1		2.2	2.1		1.91		
91-107	3C3	0.05	0.011			1.0	0.3	0.1	--	1.4	--		1.4	1.5				
107-152	4C4	TR	0.001			0.7	0.2	0.1	--	1.0	0.2		1.2	1.1				

Depth (cm)	Horizon	Al Sat (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/ Clay %	
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al					
0-5	A1		72	100	7.6	5.5	6.1	0.03	0.01	0.00	0.00	57		6.6		
5-15	A2		94	100	7.7	6.2	6.7	0.03	0.00	0.00	0.00	58		5.0		
15-41	C1		75	100	7.6	6.1	6.8	0.02	0.00	0.00	0.00	58		3.4		
41-61	2AB		75	67	7.5	5.7	6.6	0.01	0.00	0.00	0.00	59		4.7		
61-91	2C2		95	100	7.6	5.7	6.6	0.02	0.00	0.00	0.00	58		3.5	3.18	
91-107	3C3		100	93	7.5	5.4	6.4	0.01	0.00	0.00	0.00	59		4.2		
107-152	4C4		83	91	7.5	5.5	6.4	0.01	0.00	0.00	0.00	58		3.9		
Depth	Horizon	Clay Mineralogy (.022 mm)							Sand - Silt Mineralogy (2.0 - 0.002 mm)							
		Fraction	X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent			Total Retain.	Optical Grain Count 7Bla	
				DSC	TGA						Thermal (%)					
											7A6	7A4b	DT 7A3b			
				Al ₂ O ₃	Fe ₂ O ₃	K ₂ O										
0-5	A1	TCLY	MI 1	KK 2			1.0	0.7	VFS						GS75, OT18, GA 7	
5-15	A2								VFS						GS79, OT16, GA 5	
15-41	C1	TCLY	MI 1	KK 3			4.1	1.7	VFS						GS74, OT17, GA 9	
41-61	2AB															
61-91	2C2								VFS						GS69, OT22, GA 9	
91-107	3C3								VFS						GS82, OT16, GA 2	
107-152	4C4	TCLY	MI 1, MT 1	KK10			1.7	0.9	VFS						GS78, OT20, GA 3	
DITH-CIT-Extractable (all depths) FE-TR, TR, TR, 0.1, 0.1, 0.1, 0.1 & AL-0.1, TR, TR, TR, TR, TR, TR																
(all depths) KOH AL-0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00 & HUMIC COLOR-0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00 & HCL-HF COLOR-0.04, 0.09, 0.04, 0.01, 0.02, 0.02, 0.01																

SUPPLEMENTAL CHARACTERIZATION DATA																											
Map Unit 140, 144				Soil Classification - Cozetica Family												Pedon No -86P 979				NCSS Sample No							
Soil Survey- S86CA-051-006				Laboratory												Sample Date											
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve												Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at								Atterberg (pct)		Gradation			
		Inches						Number			Microns			Millimeter					Percentile					CU	CC		
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10	LL	PI	unifmty.	curvtur	
0-2	A1	100	98	97	94	93	86	78	59	42	9	2	1	TR	52	45	33	12	5	2.09	0.819	0.082			25.4	0.3	
2-6	A2	100	100	100	100	100	95	89	75	57	11	4	2	TR	68	61	45	14	8	0.47	0.310	0.064			7.5	0.9	
6-16	C1	100	100	100	99	99	97	95	86	60	19	8	4	1	78	65	46	24	14	0.41	0.289	0.027			15.3	1.5	
16-24	2AB	100	100	100	100	100	97	93	76	30	5	1	TR	TR	53	34	19	7	3	1.23	0.887	0.125			9.8	1.1	
24-36	2C2	100	100	100	100	100	90	80	58	31	9	3	2	1	45	34	23	12	6	2.16	1.325	0.081			26.6	0.8	
36-42	3C3	100	99	99	98	98	94	89	76	43	9	2	1	1	62	47	31	13	5	0.92	0.573	0.079			11.7	0.8	
42-60	4C4	100	98	96	94	92	83	73	51	26	5	1	TR	TR	39	29	18	8	2	2.84	1.887	0.120			23.7	0.9	
Depth (in)	Horizon	Weight Fractions												Weight Per Unit Volume G/CC										Void Ratios			
		Whole Soil (mm)								<75 mm Fraction				Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar									
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moi-st	Sat-urated	1/3 Bar	15 Bar	Oven Dry	Moist	Sat-urated	Whl Soil	Bar <2 mm		
0-2	A1	41	--	--	41	7	15	19	59	41	7	15	19	59	1.77												
2-6	A2	25	--	--	25	--	11	14	75	25	--	11	14	75	1.64												
6-16	C1	14	--	--	14	1	4	9	86	14	1	4	9	86	1.54												
16-24	2AB	24	--	--	24	--	7	17	76	24	--	7	17	76	1.63												
24-36	2C2	42	--	--	42	--	20	22	58	42	--	20	22	58	1.79												
36-42	3C3	24	--	--	24	2	9	13	76	24	2	9	13	76	1.64												
42-60	4C4	49	--	--	49	8	19	22	51	49	8	19	22	51	1.85												

Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil													C/N Rat- io	Ratios to Clay 2mm Fraction				Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)										
		>2	250- up	250- 75	75-2	75- 20	20- 5	5-2	<2	2- .05	.05- .002	LT .002	Pores D F			Fine Clay	CEC		-15 Bar H ₂ O	LE 1/3 Bar	Whole Soil		<2mm											
																	Sum CATS	NH ₄ OAc			-15 Bar	Oven Dry	-15 Bar	Oven Dry	Whole Soil	<2mm								
0-2	A1	28	--	--	28	5	10	13	72	37	3		33		16		7.67	5.33	11.00															
2-6	A2	15	--	--	15	--	7	9	85	41	5		38		13		7.75	6.50	12.50															
6-16	C1	8	--	--	8	1	2	5	92	42	8		42		10		3.50	2.50	4.25															
16-24	2AB	15	--	--	15	--	4	11	85	45	2		38		3		4.00	4.50	23.50															
24-36	2C2	28	--	--	28	--	13	15	72	35	4		32		12		2.00	1.91	3.18															
36-42	3C3	15	--	--	15	1	6	8	85	44	3		38		5		2.00	2.14	6.00															
42-60	4C4	34	--	--	34	6	13	15	66	35	1		30		4		2.00	1.83	6.50															
Depth (in)	Horizon	Weight Fraction - Clay Free														Texture Determined <2mm		PSDA (mm) Pct of 2mm			<2mm Electrical				Whole Soil									
		Whole Soil Pct of >2mm + Sand + Silt						<2mm Fraction / Pct of Sand + Silt																										
		>2	75-2	20-2	2- .05	.05- .002	LT .002	Sands					Silts		Clay										In field	By PSDA	Sand 2-.05	Silt .05- .002	Clay LT .002	PH CA-CL ₂ .01M	Re- sist OHMS	Con- duct Mmhos	Cumult. Amounts Salt inch of H ₂ O	
								VC	C	M	F	VF	C	F		MG/ KG	1/3 Bar to 15 Bar Airdry																	
0-2	A1	41	41	34	54	4	TR	12	13	20	35	12	4	3	1	S	S	91.9	7.5	0.6	5.5													
2-6	A2	25	25	25	67	7	TR	9	9	22	41	9	4	6	TR	COS	S	89.7	9.9	0.4	6.2													
6-16	C1	14	15	13	73	13	1	9	15	23	26	12	6	9	1	COS	LS	84.1	15.1	0.8	6.1													
16-24	2AB	24	24	24	73	3	TR	30	25	20	16	6	2	1	TR	COS	COS	96.4	3.4	0.2	5.7													
24-36	2C2	42	42	42	52	5	1	23	18	19	20	10	5	4	1	COS	COS	89.5	9.4	1.1	5.7													
36-42	3C3	24	24	22	72	4	1	19	19	22	24	11	4	2	1	COS	COS	93.8	5.5	0.7	5.4													
42-60	4C4	49	49	41	49	2	TR	24	21	20	20	12	3	1	1	COS	COS	96.0	3.4	0.6	5.5													

SOIL CHARACTERIZATION DATA

Map Unit Symbol		375	Soil Classification- Vitrandic Torripsamments								Pedon No-86P 980		Soil Survey ID No. -S86CA-051-007				(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight					
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75		
0-5	A1	1.0	9.1	89.9	4.1	5.0	12.7	27.9	26.2	16.6	6.5	5	2	--	79	7	
5-23	A2	1.4	13.6	85.0	6.9	6.7	10.9	23.1	24.9	18.1	8.0	7	4	--	77	11	
23-48	A3	1.0	12.9	86.1	7.8	5.1	8.7	21.5	25.8	21.1	9.0	8	4	--	80	12	
48-71	AB	1.6	16.7	81.7	8.1	8.6	17.2	24.5	19.2	13.9	6.9	8	3	--	68	11	
71-152	C	1.9	19.0	79.1	9.4	9.6	12.6	23.9	17.8	14.6	10.2	9	3	--	71	12	
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay		
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al	
0-5	A1	0.54	0.035			2.0	0.2	TR	0.3	2.5	0.7	TR	3.2	2.2		2.20	
5-23	A2	0.62	0.045			2.3	0.2	--	0.3	2.8	1.0	TR	3.8	2.9		2.07	
23-48	A3	0.29	0.025			1.9	0.2	0.2	0.3	2.6	0.1	TR	2.7	2.5		2.50	
48-71	AB	0.18	0.019			2.1	0.2	0.1	0.2	2.6	0.5	TR	3.1	2.5		1.56	
71-152	C	0.18	0.020			2.5	0.3	0.1	TR	2.9	0.1	TR	3.0	3.0		1.58	
Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/ Clay %		
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al						
0-5	A1		78	100	7.7	5.3	6.1	0.02	0.01	0.00	0.00	58		4.2	4.20		
5-23	A2		74	97	7.7	5.5	6.2	0.02	0.00	0.00	0.00	58		4.5	3.21		
23-48	A3		96	100	7.7	6.3	6.8	0.01	0.00	0.00	0.00	55		3.9	3.90		
48-71	AB		84	100	7.7	6.1	6.8	0.01	0.00	0.00	0.00	58		2.7	1.69		
71-152	C		97	97	7.7	6.4	7.1	0.01	0.00	0.00	0.00	60		2.7	1.42		
Depth	Horizon	Clay Mineralogy (.022 mm)							Sand - Silt Mineralogy (2.0 - 0.002 mm)								
		Fraction	X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent						
				DSC	TGA						Thermal (%)		Total Retain.	Optical Grain Count 7Bla			
				7A6	7A4b	Al ₂ O ₃	Fe ₂ O ₃	K ₂ O			DTA 7A3b	TGA 7A4b					
0-5	A1	TCLY	MI 1	KK 1			1.6	1.0	VFS					GS71, OT23, GA 6			
5-23	A2	TCLY							VFS					GS79, OT18, GA 3			
23-48	A3	TCLY	MI 1	KK 5			2.6	0.7	VFS					GS76, OT21, GA 3			
48-71	AB	TCLY							VFS					GS72, OT19, GA 9			
71-152	C	TCLY	MI 1	KK 6			3.4	1.1	VFS					GS62, OT27, GA11			
DITH-CIT-Extractable (all depths) FE 6C2B-0.1, 0.1, 0.1, 0.1, 0.2 & AL 6G7A-TR, TR, TR, TR, TR BULK DENSITY (depth 2) 1/3 Bar 4A1D-1.40 & oven dry 4A1H-1.40 & Whole Soil 4D1- -- & 1/3 Bar Water-13.0																	
(all depths) KOH-AL-0.0 0.0 0.0 0.0 0.0 & HUMIC COLOR-0.0 0.0 0.0 0.0 0.0 & HCl-HF COLOR-0.03 0.04 0.02 0.04 0.03																	

DITH-CIT-Extractable (all depths) FE 6C2B-0.1, 0.1, 0.1, 0.1, 0.2 & AL 6G7A-TR, TR, TR, TR BULK DENSITY (depth 2) 1/3 Bar 4A1D-1.40 & oven dry 4A1H-1.40 & Whole Soil 4D1- -- & 1/3 Bar Water-13.0

(all depths) KOH AL-0.0 0.0 0.0 0.0 0.0 & HUMIC COLOR-0.0 0.0 0.0 0.0 0.0 & HCL-HF COLOR-0.03 0.04 0.02 0.04 0.03

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit 375		Soil Classification - Vitrandic Torripsamments														Pedon No-86P 980						Soil Survey - S86CA-051-007							
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve														Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at										Atterberg (pct)		Gradation	
		Inches						Number				Microns				Millimeter					Percentile								
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10	LL	PI	unifmty.	curvtur			
0-2	A1	100	100	100	100	100	100	99	94	66	16	5	2	1	88	72	48	21	9	0.35	0.267	0.052			6.9	1.0			
2-9	A2	100	100	100	100	100	98	96	89	60	19	7	4	1	82	66	44	23	13	0.42	0.305	0.030			14.0	1.5			
9-19	A3	100	100	100	100	100	98	96	88	56	17	8	4	1	80	62	39	20	12	0.48	0.352	0.032			15.1	1.8			
19-28	AB	100	100	100	100	100	99	97	89	66	25	9	4	1	83	70	53	32	16	0.33	0.217	0.024			13.9	1.1			
28-60	C	100	100	100	100	100	99	97	88	62	25	10	5	2	79	66	51	29	18	0.38	0.244	0.020			18.9	1.4			
Depth (in)	Horizon	Weight Fractions														Weight Per Unit Volume G/CC										Void Ratios			
		Whole Soil (mm)								<75 mm Fraction						Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar									
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moist	Saturated	1/3 Bar	15 Bar	Oven Dry	Moist	Saturated	Whl Soil	Bar <2 mm				
0-2	A1	6	—	—	6	—	1	5	94	6	—	1	5	94	1.49														
2-9	A2	11	—	—	11	—	4	7	89	11	—	4	7	89	1.34	1.34	1.50	1.00	1.40	1.40	1.40	1.58	1.00						
9-19	A3	12	—	—	12	—	4	8	88	12	—	4	8	88	1.53														
19-28	AB	11	—	—	11	—	3	8	89	11	—	3	8	89	1.53														
28-60	C	12	—	—	12	—	3	9	88	12	—	3	9	88	1.54														
Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil														C/N Ratio	Ratios to Clay 2mm Fraction				Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)				
		>2	250-up	250-75	75-2	75-20	20-5	5-2	<2	2-.05	.05-.002	LT .002	Pores D	F	Fine Clay		Sum CATS	NH ₄ OAc	-15 Bar H ₂ O	LE 1/3 Bar	-15 Bar	Oven Dry	-15 Bar	Oven Dry			Whole Soil	<2mm	
		0-2	A1	3	—	—	3	—	1	3	97	48	5	1	44		15		3.20	2.20	4.20								
2-9	A2	15	—	—	15	—	5	9	85	38	6	1		15	14		2.71	2.07	3.21						0.10	0.12			
9-19	A3	7	—	—	7	—	2	5	93	44	7	1	42		12		2.70	2.50	3.90										
19-28	AB	6	—	—	6	—	2	5	94	42	9	1	42		10		1.94	1.56	1.69										
28-60	C	7	—	—	7	—	2	5	93	40	10	1	42		9		1.58	1.58	1.42										
Depth (in)	Horizon	Weight Fraction - Clay Free														Texture Determined <2mm	PSDA (mm) Pct of 2mm				<2mm Electrical				Whole Soil				
		Whole Soil Pct. of >2mm + Sand + Silt						<2mm Fraction / Pct of Sand + Silt																					
		>2	75-2	20-2	2-.05	.05-.002	LT .002	VC	C	M	F	VF	C	F			In field	By PSDA	Sand 2-.05	Silt .05-.002	Clay LT .002	PH CA-CL ₂ .01M	Re-sist OHMS	Conduct Mmhos	Cumult. Amounts Salt inch of H ₂ O				
0-2	A1	6	6	6	85	9	1	7	17	26	28	13	5	4	1	COS	S	89.9	9.1	1.0	5.3								
2-9	A2	11	11	11	77	12	1	8	18	25	23	11	7	7	1	COS	LCOS	85.0	13.6	1.4	5.5								
9-19	A3	12	12	12	76	11	1	9	21	26	22	9	5	8	1	COS	COS	86.1	12.9	1.0	6.3								
19-28	AB	11	11	11	74	15	1	7	14	20	25	17	9	8	2	S	LS	81.7	16.7	1.6	6.1								
28-60	C	12	12	12	71	17	2	10	15	18	24	13	10	10	2	COS	LS	79.1	19.0	1.9	6.4								

SOIL CHARACTERIZATION DATA																	
Map Unit Symbol		137		Soil Classification- Vitrandic Xerorthents, pumiceous, warm							Pedon No-86P 981		Soil Survey ID No. -S86CA-051-008				(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight					
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75		
0-10	A1	0.4	3.5	96.1	1.0	2.5	5.7	17.8	28.6	26.9	17.1	17	7	1	93	25	
10-23	A2	0.9	14.9	84.2	7.4	7.5	8.8	18.8	23.7	20.7	12.2	13	11	TR	81	24	
23-58	2BW	0.6	11.2	88.2	5.7	5.5	7.4	4.8	14.2	23.8	38.0	25	39	2	93	66	
58-81	3C1	0.8	7.0	92.2	4.5	2.5	2.0	6.5	9.7	25.9	48.1	24	27	TR	95	51	
81-112	4C2	1.0	16.2	82.8	8.3	7.9	9.4	22.2	21.4	17.2	12.6	15	7	--	79	22	
112-152	4C3	0.8	10.1	89.1	5.9	4.2	7.8	22.3	26.2	21.4	11.4	10	5	--	84	15	
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay		
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al	
0-10	A1	0.16	0.010			0.9	0.3	TR	TR	1.2	0.8		2.0	2.0			
10-23	A2	0.17	0.009			2.5	0.6	TR	0.1	3.2	0.5		3.7	3.0			
23-58	2BW	0.11	0.006			1.5	0.5	0.1	0.1	2.2	0.5		2.7	2.5			
58-81	3C1	0.10	0.004			1.7	0.5	TR	TR	2.2	0.8		3.0	2.2			
81-112	4C2	0.07	0.002			0.8	0.2	TR	0.1	1.1	0.2		1.3	1.3		1.30	
112-152	4C3	0.14	0.007			1.1	0.2	TR	0.1	1.4	0.5		1.9	1.5			

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit 137		Soil Classification - Vitrandic Xerorthents, pumiceous, warm													Pedon No - 86P 981					NCSS Sample No							
Soil Survey- S86CA-051-008		Laboratory													Sample Date												
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve													Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at									Atterberg (pct)		Gradation	
		Inches						Number				Microns			Millimeter					Percentile							
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10	LL	PI	unifmty.	curvtur	
0-4	A1	100	100	100	99	99	96	92	75	37	5	1	1	TR	62	42	21	7	3	0.93	0.658	0.121			7.7	1.0	
4-9	A2	100	100	100	100	100	95	90	77	47	16	6	3	1	68	52	33	19	12	0.72	0.469	0.035			20.3	1.6	
9-23	2BW	100	99	99	98	98	79	59	34	12	5	2	1	TR	21	13	8	7	4	4.87	3.456	0.326			15.0	1.6	
23-32	3C1	100	100	100	100	100	87	73	50	12	4	3	1	TR	26	13	8	5	4	2.90	2.000	0.326			8.9	1.3	
32-44	4C2	100	100	100	100	100	97	93	78	51	18	7	3	1	68	55	38	21	13	0.66	0.410	0.030			21.8	1.4	
44-60	4C3	100	100	100	100	100	98	95	85	52	13	6	3	1	75	57	35	16	9	0.56	0.401	0.054			10.3	1.3	
Depth (in)	Horizon	Weight Fractions													Weight Per Unit Volume G/CC										Void Ratios		
		Whole Soil (mm)								<75 mm Fraction					Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar								
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moi-st	Sat-urated	1/3 Bar	15 Bar	Oven Dry	Moist	Sat-urated	Whl Soil	Bar <2 mm		
0-4	A1	25	–	–	25	1	7	17	75	25	1	7	17	75	1.63												
4-9	A2	23	–	–	23	TR	10	13	77	23	TR	10	13	77	1.63												
9-23	2BW	66	–	–	66	2	39	25	34	66	2	39	25	34	2.07												
23-32	3C1	50	–	–	50	TR	27	23	50	50	TR	27	23	50	1.12	1.15	1.21	1.00	1.29	1.34	1.35	1.50	1.00				
32-44	4C2	22	–	–	22	–	7	15	78	22	–	7	15	78	1.61												
44-60	4C3	15	–	–	15	–	5	10	85	15	–	5	10	85	1.56												

SOIL CHARACTERIZATION DATA

Map Unit Symbol 115		Soil Classification- Vitrandic Xerorthents, ashy, warm								Pedon No-86P 982		Soil Survey ID No. -S86CA-051-009					(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight					
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75		
0-3	A1	2.2	20.1	77.7	9.3	10.8	17.3	15.3	16.0	16.1	13.0	6	5	--	65	11	
3-18	A2	1.7	20.1	78.2	10.3	9.8	12.8	18.9	17.1	17.5	11.9	11	7	--	72	18	
18-41	A3	1.8	21.1	77.1	10.0	11.1	15.0	20.3	18.5	14.5	8.8	10	8	--	69	18	
41-74	2C1	1.8	22.5	75.7	8.2	14.3	12.2	12.2	16.8	18.4	16.1	7	47	--	83	54	
74-152	2C2	2.2	30.7	67.1	19.5	11.2	11.3	12.3	12.5	14.3	16.7	--	--	--	56	--	
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay		
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al	
0-3	A1	2.18	0.087			6.2	0.5	TR	0.4	7.1	4.7	0.1	11.8	9.1		4.14	
3-18	A2	1.64	0.058			6.9	0.6	TR	0.4	7.9	5.2	0.1	13.1	8.9		5.24	
18-41	A3	0.64	0.027			3.3	0.4	TR	0.5	4.2	2.8	0.1	7.0	5.0		2.78	
41-74	2C1	0.52	0.017			3.3	0.7	0.1	0.8	4.9	2.6	TR	7.5	6.0		3.33	
74-152	2C2	0.03	0.002			1.1	0.3	0.4	0.7	2.5	0.8	TR	3.3	2.9		1.32	
Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/ Clay %		
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al						
0-3	A1		60	78	8.2	5.1	5.8	0.12	0.12	0.00	0.07	58		4.6	2.09		
3-18	A2		60	89	9.2	5.4	6.3	0.11	0.11	0.00	0.09	59		3.5	2.06		
18-41	A3		60	84	8.9	5.6	6.5	0.05	0.10	0.02	0.08	59		3.1	1.72		
41-74	2C1		65	82	8.0	5.6	6.5	0.03	0.04	0.01	0.04	58		4.2	2.33		
74-152	2C2		76	86	8.8	6.7	7.4	0.02	0.02	0.00	0.02	56		3.9	1.77		
Depth	Horizon	Clay Mineralogy (.022 mm)							Sand - Silt Mineralogy (2.0 - 0.002 mm)								
		Fraction	X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent						
				DSC	TGA						Thermal (%)		Total Retain.	Optical Grain Count 7B1a			
				7A6	7A4b	Al ₂ O ₃	Fe ₂ O ₃	K ₂ O			DTA 7A3b	TGA 7A4b					
0-3	A1								VFS					GS72, OT17, GA12			
3-18	A2	TCLY	KK 1	KK 5			2.6	0.7	VFS					GS80, OT15, GA 5			
18-41	A3	TCLY	MI1, KK1	KK12			3.6	0.9	VFS					GS72, OT19, GA 9			
41-74	2C1								VFS					GS59, GA21, OT20			
74-152	2C2	TCLY	MI 1	KK27			1.9	1.1	VFS					GS94, OT 6, GAtr			
DITH-CIT-Extractable (all depths) FE 6C2B-0.2, 0.2, 0.2, 0.2, 0.1 & AL 6G7A-0.1, 0.1, 0.1, TR, TR BULK DENISTY (depths 2, 3, 5) 1/3 Bar-1.24, 1.31, 1.61 & oven dry 4A1H-1.25, 1.32, 1.62 & Whole Soil 4D1-0.002, 0.002, 0.002 & (all depths) KOH AL-0.1, 0.1, 0.1, 0.0, 0.0, 0.0 & HUMIC COLOR-0.0, 0.0, 0.0, 0.0, 0.0 & HLC-HF COLOR-0.09, 0.13, 0.05, 0.03, 0.02																	

SUPPLEMENTAL CHARACTERIZATION DATA

Soil Survey- S86CA-051-009				Map Unit 115				Pedon No. - 86P 982				Soil Classification - Vitrandic Xerorthents, ashy, warm														
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve												Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at									Atterberg (pct)		Gradation	
		Inches						Number			Microns			Millimeter					Percentile							
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10	LL	PI	unifmty.	curvtur
0-1	A1	100	100	100	100	100	98	95	89	60	29	10	5	2	77	63	49	35	20	0.43	0.264	0.019			23.0	0.8
1-7	A2	100	100	100	100	100	97	94	83	55	24	10	5	1	73	59	44	29	18	0.53	0.329	0.020			26.6	1.1
7-16	A3	100	100	100	100	100	96	92	82	59	26	10	5	1	75	63	48	31	19	0.44	0.277	0.021			21.2	1.0
16-29	2C1	100	100	100	100	100	77	53	46	28	14	5	2	1	39	30	22	17	11	5.79	3.259	0.042			>100	1.0
29-60	2C2	100	100	100	100	100	100	100	100	66	39	22	10	2	83	69	57	44	33	0.30	0.154	0.005			60.4	1.0
Depth (in)	Horizon	Weight Fractions												Weight Per Unit Volume G/CC								Void Ratios				
		Whole Soil (mm)						<75 mm Fraction						Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar								
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moist	Saturated	1/3 Bar	15 Bar	Oven Dry	Moist	Saturated	Whl Soil	Bar <2 mm	
0-1	A1	11	--	--	11	--	5	6	89	11	--	5	6	89	1.53											
1-7	A2	17	--	--	17	--	6	11	83	17	--	6	11	83	1.19	1.20	1.34	1.00	1.24	1.25	1.25	1.44	1.00	0.002	0.15	
7-16	A3	18	--	--	18	--	8	10	82	18	--	8	10	82	1.24	1.25	1.38	1.00	1.31	1.32	1.32	1.49	1.00	0.002	0.14	
16-29	2C1	54	--	--	54	--	47	7	46	54	--	47	7	46	1.92											
29-60	2C2	--	--	--	--	--	--	--	100	--	--	--	--	100	1.61	1.62	1.72	1.00	1.61	1.62	1.62	1.73	1.00	0.002	0.06	
Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil												C/N Ratio	Ratios to Clay 2mm Fraction				Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)			
		>2	250-up	250-75	75-2	75-20	20-5	5-2	<2	2-.05	.05-.002	LT .002	Pores D F		Fine Clay	CEC		-15 Bar H ₂ O	LE 1/3 Bar	Whole Soil		<2mm				
																	Sum CATS			NH ₄ OAc			-15 Bar	Oven Dry	-15 Bar	Oven Dry
0-1	A1	6	--	--	6	--	3	3	94	40	10	1	42	25		5.41	4.14	2.09								
1-7	A2	20	--	--	20	--	7	13	80	29	7	1	14	28		7.71	5.24	2.06	0.176	0.3	0.3	0.3	0.3	0.12	0.15	
7-16	A3	22	--	--	22	--	10	12	78	29	8	1	13	24		3.89	2.78	1.72	0.167	0.3	0.3	0.3	0.3	0.11	0.14	
16-29	2C1	39	--	--	39	--	34	5	61	25	8	1	28	31		4.17	3.33	2.33								
29-60	2C2	--	--	--	--	--	--	--	100	41	19	1	10	15		1.50	1.32	1.77	0.091	0.02	0.2	0.2	0.2	0.2	0.06	0.06
Depth (in)	Horizon	Weight Fraction - Clay Free												Texture Determined <2mm	PSDA (mm) Pct of 2mm				<2mm Electrical				Whole Soil			
		Whole Soil Pct. of >2mm + Sand + Silt						<2mm Fraction / Pct of Sand + Silt							Sand 2-.05	Silt .05-.002	Clay LT .002	PH Ca-Cl ₂ .01M	Re-sist OHMS	Conduct Mmhos	Cumult. Amounts Salt inch of H ₂ O					
		>2	75-2	20-2	2-.05	.05-.002	LT .002	VC		M	F	VF	C	F								In field	By PSDA			
0-1	A1	11	11	11	71	18	2	13	16	16	16	18	11	10	2	COS	LCOS	77.7	20.1	2.2	5.1					
1-7	A2	17	17	17	66	17	1	12	18	17	19	13	10	10	2	COS	LCOS	78.2	20.1	1.7	5.4					
7-16	A3	18	18	18	64	18	1	9	15	19	21	15	11	10	2	COS	LS	77.1	21.1	1.8	5.6					
16-29	2C1	54	54	54	35	10	1	16	19	17	12	12	15	8	2		LCOS	75.7	22.5	1.8	5.6					
29-60	2C2				69	31	2	17	15	13	13	12	11	20	2		COSL	67.1	30.7	2.2	6.7					

SOIL CHARACTERIZATION DATA																	
Map Unit Symbol		111		Soil Classification - Vitrandic Xerorthents, ashy (Inclusion)							Pedon No-86P983		Soil Survey ID No. -S86CA-051-010				(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight					
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75		
3-0	OE	1.7	23.2	75.1	10.6	12.6	15.5	21.6	14.5	12.5	11.0	7	12	--	67	19	
0-10	A	1.7	23.3	75.0	10.7	12.6	15.6	22.7	15.2	12.5	9.0	6	6	2	65	14	
10-36	BW	1.3	21.5	77.2	10.0	11.5	16.6	24.1	17.4	11.9	7.2	7	6	--	66	13	
36-58	2C1	1.1	20.0	78.9	9.6	10.4	14.3	27.0	18.5	11.0	8.1	7	3	--	68	10	
58-119	2C3	1.5	15.0	83.5	7.4	7.6	13.8	35.2	19.8	9.5	5.2	5	7	18	79	50	
119-152	2C3	2.9	21.9	75.2	14.0	8.0	16.7	31.4	12.8	9.7	4.6	1	TR	--	59	1	
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay		
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al	
3-0	OE	2.81	0.102			7.8	0.7	TR	0.4	8.9	7.5		16.4	11.5		6.76	
0-10	A	2.69	0.107			13.9	0.8	0.1	0.6	15.4	5.0		20.4	13.9		8.18	
10-36	BW	0.72	0.029			4.3	0.3	TR	0.4	5.0	3.5		8.5	5.8		4.46	
36-58	2C1	0.36	0.011			3.1	0.3	TR	0.5	3.9	1.7		5.6	4.0		3.64	
58-119	2C3	0.25	0.005			1.9	0.4	0.1	0.6	3.0	2.3		5.3	3.7		2.47	
119-152	2C3	0.22	0.005			2.8	0.2	TR	1.4	4.4	2.0		6.4	4.8		1.66	

Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/ Clay %	
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al					
3-0	OE		54	77	8.7	5.1	5.8	0.18	0.11	0.01	0.14	58		5.1	3.00	
0-10	A		75	100	9.3	6.0	6.6	0.23	0.12	0.02	0.13	58		6.9	4.06	
10-36	BW		59	86	9.1	5.6	6.4	0.08	0.09	0.03	0.12	58		3.1	2.38	
36-58	2C1		70	97	8.3	5.9	6.7	0.04	0.08	0.01	0.05	58		2.9	2.64	
58-119	2C3		57	81	7.9	5.1	6.0	0.02	0.02	0.00	0.02	58		5.0	3.33	
119-152	2C3		69	92	8.8	5.9	6.7	0.02	0.00	0.00	0.04	56		4.3	1.48	
Depth	Horizon	Fraction	X-Ray Peak Size 7A2i	Clay Mineralogy (.022 mm)					Sand - Silt Mineralogy (2.0 - 0.002 mm)							
					X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent			
						DSC	TGA						Thermal (%)		Total Retain.	Optical Grain Count 7B1a
								7A6	7A4b	Al ₂ O ₃			Fe ₂ O ₃	K ₂ O		
						3-0	OE									
0-10	A	TCLY	MT1 KK1 MI1	Gltr			2.3	0.8	VFS						GS71, OT23, GA 7	
10-36	BW	TCLY	MT1 KK1 MI1	KK 5			3.4	0.8	VFS						GS76, OT18, GA 6	
36-58	2C1								VFS						GS75, OT19, GA 6	
58-119	2C3								VFS						GS70, OT22, GA 8	
119-152	2C3	TCLY	KK 2 MI 1	KK51			2.3	0.9	VFS						GS75, OT22, GA 3	
DITH-CIT-Extractable (all depths) FE-0.2, 0.2, 0.2, 0.2, 0.2, 0.2 & AL-0.1, 0.1, 0.1, TR, TR, TR																
BULK DENISTY (depths 2, 3, 6) 1/3 Bar 4A1D-1.10, 1.25, 1.35 & Oven Dry-1.10, 1.25, 1.35 & Whole Soil 4D1---, --, -- & WATER CONTENT 1/3 Bar 4B1C-15.6, 7.9, 14.1																
(all depths) KOH AL-0.1, 0.1, 0.1, 0.0, 0.0, 0.0 & HUMIC COLOR-6.3, 0.0, 0.0, 0.0, 0.0, 0.0 & HCL-HF COLOR-0.18, 0.23, 0.09, 0.09, 0.05, 0.05																

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit 111		Soil Classification - Vitrandic Xerorthents, ashy (Inclusion)														Pedon No - 86P 983				NCSS Sample No						
Soil Survey- S86CA-051-010		Laboratory														Sample Date										
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve												Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at								Atterberg (pct)		Gradation		
		Inches						Number			Microns			Millimeter				Percentile								
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10	LL	PI	unifmty.	curvtur
1-0	OE	100	100	100	100	100	94	88	81	59	27	10	5	1	72	62	50	33	20	0.45	0.247	0.020			22.2	0.8
0-4	A	100	99	99	98	98	95	92	86	64	29	11	5	1	78	68	54	35	21	0.34	0.203	0.017			19.8	1.1
4-14	BW	100	100	100	100	100	97	94	87	67	28	10	5	1	81	70	55	34	20	0.31	0.199	0.020			15.3	1.1
14-23	2C1	100	100	100	100	100	99	97	90	69	26	10	4	1	83	73	56	32	19	0.29	0.198	0.021			14.1	1.3
23-47	2C3	100	95	91	86	82	79	75	70	56	17	6	3	1	66	60	46	21	12	0.52	0.308	0.038			13.5	1.0
47-60	2C3	100	100	100	100	100	100	100	99	82	33	17	8	3	94	85	72	41	25	0.17	0.130	0.007			26.3	3.4
Depth (in)	Horizon	Weight Fractions												Weight Per Unit Volume G/CC								Void Ratios				
		Whole Soil (mm)							<75 mm Fraction					Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar								
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moi-st	Sat-urated	1/3 Bar	15 Bar	Oven Dry	Moist	Sat-urated	Whl Soil	Bar <2 mm	
1-0	OE	19	–	–	19	–	12	7	81	19	–	12	7	81	1.59											
0-4	A	14	–	–	14	2	6	6	86	14	2	6	6	86	1.08	1.08	1.22	1.00	1.10	1.10	1.10	1.27	1.00			
4-14	BW	13	–	–	13	–	6	7	87	13	–	6	7	87	1.21	1.21	1.29	1.00	1.25	1.25	1.25	1.35	1.00			
14-23	2C1	10	–	–	10	–	3	7	90	10	–	3	7	90	1.52											
23-47	2C3	50	7	21	22	13	5	4	50	30	18	7	5	70	1.87											
47-60	2C3	1	–	–	1	–	TR	1	99	1	–	TR	1	99	1.34	1.34	1.53	1.00	1.35	1.35	1.35	1.54	1.00			

Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil														C/N Rat- io	Ratios to Clay 2mm Fraction					Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)	
		>2	250- up	250- 75	75-2	75- 20	20- 5	5-2	<2	2- .05	.05- .002	LT .002	Pores D F		Fine Clay		CEC		-15 Bar H ₂ O	LE 1/3 Bar	Whole Soil		<2mm				
																	Sum CATS	NH ₄ OAc			-15 Bar	Oven Dry	-15 Bar	Oven Dry			
													Whole Soil	<2mm													
1-0	OE	11	--	--	11	--	7	4	89	36	11	1	40		28		9.65	6.76	3.00								
0-4	A	15	--	--	15	2	7	7	85	26	8	1		13	25		12.00	8.18	4.06						0.08	0.10	
4-14	BW	16	--	--	16	--	7	8	84	31	9	1		7	25		6.54	4.46	2.38						0.05	0.06	
14-23	2C1	6	--	--	6	--	2	4	94	41	10	1	43		33		5.09	3.64	2.64								
23-47	2C3	36	5	15	16	9	4	3	64	30	5	1	29		49		3.53	2.47	3.33								
47-60	2C3	1	--	--	1	--	TR	1	99	37	11	1		18	43		2.21	1.66	1.48						0.13	0.13	

Depth (in)	Horizon	Weight Fraction - Clay Free														Texture Determined <2mm	PSDA (mm) Pct of 2mm				<2mm Electrical				Whole Soil	
		Whole Soil Pct. of >2mm + Sand + Silt							<2mm Fraction / Pct of Sand + Silt																	
		>2	75-2	20-2	2- .05	.05- .002	LT .002	Sands					Silts		Clay										In field	By PSDA
								VC	C	M	F	VF	C	F		MG/ KG	1/3 Bar to 15 Bar Airdry									
1-0	OE	19	19	19	62	19	1	11	13	15	22	16	13	11	2		LS	75.1	23.2	1.7	5.1					
0-4	A	14	14	12	65	20	1	9	13	15	23	16	13	11	2	COS	LS	75.0	23.3	1.7	6.0					
4-14	BW	13	13	13	68	19	1	7	12	18	24	17	12	10	1	S	LS	77.2	21.5	1.3	5.6					
14-23	2C1	10	10	10	72	18	1	8	11	19	27	14	11	10	1	S	LS	78.9	20.0	1.1	5.9					
23-47	2C3	50	22	9	42	8	1	5	10	20	36	14	8	8	2	S	LS	83.5	15.0	1.5	5.1					
47-60	2C3	1	1	1	77	22	3	5	10	13	32	17	8	14	3	S	LS	75.2	21.9	2.9	5.9					

SOIL CHARACTERIZATION DATA

Map Unit Symbol		111	Soil Classification- Vitrandic Xeropsamments							Pedon No-86P 984		Soil Survey ID No. -S86CA-051-011				
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight				(>2MM) Wt. % of Whole Soil
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75	
0-8	A1	1.5	19.8	78.7	9.2	10.6	13.5	20.8	17.1	15.2	12.1	7	4	--	69	11
8-18	A2	1.0	19.7	79.3	9.3	10.4	13.2	20.9	19.0	16.4	9.8	9	4	--	71	13
18-33	BW1	1.5	19.6	78.9	8.9	10.7	14.2	23.4	19.5	14.4	7.4	7	3	--	68	10
33-86	BW2	2.1	16.5	81.4	8.5	8.0	12.5	22.2	20.3	16.0	10.4	9	5	TR	73	14
86-152	C	1.7	16.9	81.4	8.5	8.4	14.0	24.7	20.8	14.2	7.7	11	3	--	72	14
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)				CEC/Clay
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc	Bases Plus Al	
0-8	A1	1.64	0.073			5.0	0.4	TR	0.5	5.9	3.8		9.7	7.0		4.67
8-18	A2	0.67	0.030			2.2	0.3	TR	0.5	3.0	3.2		6.2	5.2		5.20
18-33	BW1	0.44	0.018			1.4	0.1	TR	0.4	1.9	3.2		5.1	3.9		2.60
33-86	BW2	0.19	0.012			2.0	0.3	0.1	0.4	2.8	1.8		4.6	3.9		1.86
86-152	C	0.07	0.006			1.0	0.3	0.1	0.3	1.7	2.3	0.4	4.0	3.2	2.1	1.88
Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/ Clay %	
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al					
0-8	A1		61	84	9.3	5.6	6.4	0.10	0.15	0.01	0.09	57		5.7	3.80	
8-18	A2		48	58	9.5	5.3	6.2	0.06	0.13	0.01	0.09	58		3.4	3.40	
18-33	BW1		37	49	9.3	4.9	5.9	0.05	0.14	0.01	0.08	58		3.2	2.13	
33-86	BW2		61	72	8.0	4.9	5.8	0.03	0.09	0.00	0.01	58		3.5	1.67	
86-152	C	19	42	53	7.8	4.3	5.4	0.02	0.06	0.00	0.00	58		3.2	1.88	
Depth	Horizon	Clay Mineralogy (.022 mm)							Sand - Silt Mineralogy (2.0 - 0.002 mm)							
		Fraction	X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent					
				DSC	TGA						Thermal (%)		Total Retain.	Optical Grain Count 7B1a		
				7A6	7A4b	Al ₂ O ₃	Fe ₂ O ₃	K ₂ O			DTA 7A3b	TGA 7A4b				
0-8	A1	TCLY	KK 1, MI 1	KKtr	--		2.9	0.6	VFS					GS62, OT25, GA14		
8-18	A2	TCLY	MT 1, KK 1	KK 9			3.9	0.8	VFS					GS76, OT19, GA 5		
18-33	BW1								VFS					GS69, OT22, GA 9		
33-86	BW2	TCLY	MT1, KK1, ML1	KK 5			3.6	0.7	VFS					GS75, OT20, GA 5		
86-152	C	TCLY	KK 2, MI 1	KK23			4.1	1.0	VFS					GS66, OT28, GA 6		
DITH-CIT - Extractable (all depths) FE-0.2, 0.2, 0.2, 0.2, 0.2 & AL-0.1, 0.1, 0.1, TR, TR																
(all depths) KOH AL-0.1, 0.1, 0.1, 0.0, 0.0 & HUMIC COLOR-0.0, 0.0, 0.0, 0.0, 0.0 & HCL-HF COLOR-0.15, 0.08, 0.05, 0.09, 0.04																

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit 111		Soil Classification - Vitrandic Xeropsamments													Pedon No -86P 984					Soil Survey -S86CA-051-011							
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve													Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at									Atterberg (pct)		Gradation	
		Inches						Number				Microns			Millimeter					Percentile							
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10	LL	PI	unifmt.	curvtur	
0-3	A1	100	100	100	100	100	98	96	89	61	26	10	5	1	78	65	49	31	19	0.40	0.256	0.021			19.3	1.1	
3-7	A2	100	100	100	100	100	98	96	87	60	25	9	4	1	78	64	48	29	18	0.42	0.276	0.022			18.9	1.1	
7-13	BW1	100	100	100	100	100	99	97	90	66	26	9	5	1	83	70	53	32	19	0.33	0.221	0.021			15.6	1.2	
13-34	BW2	100	100	100	100	100	98	95	86	59	22	9	5	2	77	63	46	27	16	0.44	0.295	0.023			19.5	1.4	
34-60	C	100	100	100	100	100	99	97	86	63	23	9	4	1	79	67	49	28	16	0.38	0.257	0.023			16.2	1.3	
Depth (in)	Horizon	Weight Fractions													Weight Per Unit Volume G/CC										Void Ratios		
		Whole Soil (mm)								<75 mm Fraction					Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar								
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moi-st	Sat-urated	1/3 Bar	15 Bar	Oven Dry	Moist	Sat-urated	Whl Soil	Bar <2 mm		
0-3	A1	11	--	--	11	--	4	7	89	11	--	4	7	89	1.52												
3-7	A2	13	--	--	13	--	4	9	87	13	--	4	9	87	1.54												
7-13	BW1	10	--	--	10	--	3	7	90	10	--	3	7	90	1.52												
13-34	BW2	14	--	--	14	TR	5	9	86	14	TR	5	9	86	1.56												
34-60	C	14	--	--	14	--	3	11	86	14	--	3	11	86	1.55												
Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil												C/N Ratio	Ratios to Clay 2mm Fraction				Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)				
		>2	250-up	250-75	75-2	75-20	20-5	5-2	<2	2-.05	.05-.002	LT .002	D		Pores	F	Fine Clay	CEC		-15 Bar H ₂ O	LE 1/3 Bar	Whole Soil			<2mm		
																			Sum CATS	NH ₄ OAc			-15 Bar	Oven Dry	-15 Bar	Oven Dry	Whole Soil
0-3	A1	6	--	--	6	--	2	4	94	40	10	1	43		22		6.47	4.67	3.80								
3-7	A2	8	--	--	8	--	2	5	92	40	10	1	42		22		6.20	5.20	3.40								
7-13	BW1	6	--	--	6	--	2	4	94	41	10	1	43		24		3.40	2.60	2.13								
13-34	BW2	8	--	--	8	TR	3	5	92	40	8	1	41		16		2.19	1.86	1.67								
34-60	C	8	--	--	8	--	2	6	92	41	9	1	41		12		2.35	1.88	1.88								
Depth (in)	Horizon	Weight Fraction - Clay Free													Texture Determined <2mm	PSDA (mm) Pct of 2mm			<2mm Electrical			Whole Soil					
		Whole Soil Pct. of >2mm + Sand + Silt						<2mm Fraction / Pct of Sand + Silt								Sands		Silt		Clay		Cumult. Amounts Salt inch of H ₂ O					
		>2	75-2	20-2	2-.05	.05-.002	LT .002	VC	C	M	F	VF	C	F		In field	By PSDA	Sand 2-.05	Silt .05-.002	Clay LT .002	PH CA-CL ₂ .01M	Re-sist OHMS	Conduct Mmhos	MG/ KG	1/3 Bar to 15 Bar Airdry		
0-3	A1	11	11	11	71	18	1	12	15	17	21	14	11	9	2	COS	LCOS	78.7	19.8	1.5	5.6						
3-7	A2	13	13	13	70	17	1	10	17	19	21	13	11	9	1	COS	LCOS	79.3	19.7	1.0	5.3						
7-13	BW1	10	10	10	72	18	1	8	15	20	24	14	11	9	2	COS	LS	78.9	19.6	1.5	4.9						
13-34	BW2	14	14	14	71	14	2	11	16	21	23	13	8	9	2	COS	LCOS	81.4	16.5	2.1	4.9						
34-60	C	14	14	14	71	15	1	8	14	21	25	14	9	9	2	COS	LS	81.4	16.9	1.7	4.3						

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Glossary

Adamellite. A phaneritic rock containing major plagioclase, orthoclase and quartz, with minor amounts of biotite and hornblende.

Alkaline Soil. Any soil having a pH higher than 7.0.
See Reaction, soil.

Alluvial depressions. Low-lying areas subject to alluvial deposition. These include playas, basins, stream valleys, washes and other drainages.

Alluvial fan. A sloping, fan-shaped mass of sediment deposited by a stream where it emerges from an upland onto a plain.

Alluvial terrace. An old alluvial plain, ordinarily flat or hummocky, bordering a river, lake or sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Alluvium. Material, such as sand, silt, or clay, deposited on land by water action.

Andesite. A volcanic rock composed essentially of andesine and one or more mafic constituents.

Argillic horizon. **See Diagnostic horizons.**

Aspect. The direction a slope is facing; its exposure in relation to the sun.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It commonly is expressed in inches of water per inch of soil.

Ballena. A ridgecrest (literally, a whale).

Basalt. An extrusive rock composed primarily of calcic plagioclase and pyroxene, with or without olivine.

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K) expressed as a percentage of the total cation exchange capacity.

Bedrock. Solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly occurring with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Calcic horizon. **See Diagnostic horizons.**

Cambic horizon. **See Diagnostic horizons.**

Canyon. A long, deep, narrow, very steep-sided valley with high and precipitous walls in an area of high local relief.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value.

Cirque. Semicircular, concave, bowl-like areas that have steep faces primarily resulting from glacial ice and snow abrasion.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels
Synonyms: Clay coating, clay skin.

Claypan. A dense, compact layer in the subsoil having a much higher clay content than the overlying material, from which it is separated by a sharply defined boundary; formed by downward movement of clay or by synthesis of clay in place during soil formation. Claypans mainly are hard when dry and plastic and sticky when wet. They generally impede the movement of water and air and the growth of plant roots.

Cobble. A fragment of rock 3 to 10 inches (7.62 to 25.40 cm) in diameter.

Colluvial slope. An inclined surface usually at the base of mountainsides formed by material transported and deposited by mass wasting (direct gravitational action) and local unconcentrated runoff.

Colluvium. A deposit of soil material, rock fragments, or both, accumulated on steep slopes or at the base of steep slopes primarily by the action of gravity but facilitated by the overland flow of water.

Color. See **Munsell notation**.

Compaction, soil. Densifying or increasing the unit weight of a soil mass and inversely decreasing its porosity. The degree of compaction is a function of soil moisture, the nature of soil involved, and pressure applied.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate geographical pattern or so small in area that it is not practical to map them separately at the selected scale of mapping.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose. Noncoherent when dry or moist; does not hold together in a mass.

Friable. When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm. When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic. When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky. When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard. When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft. When dry, breaks into powder or individual grains under very slight pressure.

Cemented. Hard; little affected by moistening.

Consociation, soil. A map unit in which only one kind of soil or miscellaneous area dominates.

Control Section. That part of a soil profile containing the horizons that determine the placement of the soil in the new system of soil classification. Generally, these horizons are between a depth of 10 inches and 40 inches.

Cryic soil temperature regime. A soil temperature regime where mean annual soil temperature is higher than 32° F. (0°C), but lower than 47° F (8°C). and the mean summer soil temperature is less than 59° F. (15°C), at a depth of 20 inches or at a lithic or paralithic contact, whichever is shallower.

Depth Class. The distance from the surface of the soil to underlying bedrock, consolidated substratum, or other material that would greatly restrict either root distribution or soil moisture and nutrient supply.

Very shallow	less than 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

Diagnostic horizons. As used in the soil classification system of the National Cooperative Soil Survey in the United States, combinations of specific characteristics that indicate certain classes of soils. Those that occur at the soil's surface are called epipedons. Those below the surface are called diagnostic subsurface horizons.

Argillic horizon. A subsurface horizon into which clay has moved. It has more than 1.2 times the amount of clay that the horizons above it have. The presence of clay films on ped surfaces and in soil pores is evidence of clay movement.

Calcic horizon. A horizon of accumulation of calcium carbonate or of calcium carbonate and magnesium carbonate, usually in the C horizon, but may also be in other horizons such as a mollic epipedon, an argillic or a natric horizon, or a duripan.

Cambic horizon. A subsurface horizon that is finer than loamy fine sand in texture and in which materials have been altered or removed, but have not accumulated. Elimination of fine stratification; changes caused by wetness, such as gray color and mottling; redistribution of carbonates; and yellower or redder color than in underlying horizons are evidence of alteration.

Mollic epipedon. A dark-colored surface horizon, generally more than 7 inches thick. It contains more than 1 percent organic matter and has more than 50 percent base saturation. It is not both hard and massive when dry. Color is darker than 3.5 in value when moist and 5.5 in value when dry, and is less than 3.5 in chroma when moist.

Ochric epipedon. A surface horizon that is too light in color (higher in value or chroma than a mollic epipedon), too low in organic matter or too thin to be a mollic or umbric epipedon.

Pachic epipedon. A dark-colored surface horizon, similar to the Mollic epipedon, but thicker than 20 inches.

Dolomite. A mineral, $\text{CaMg}(\text{CO}_3)_2$, commonly with some Fe replacing the Mg.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained. Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained. Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained. Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained. Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained. Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained. Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, or nearly continuous rainfall, or a combination of these.

Very poorly drained. Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Very poorly drained soils are commonly level or depressed and are frequently ponded.

Drainages, modern. A drainage whose capacity to transport a load is greater than the load it is called upon to carry. These drainages usually have a steep gradient and therefore swift water movement. (Contrast with a mature drainage, whose capacity to transport a load is equal to the load it is called upon to carry.)

Drainages, recent. See **Drainages, modern.**

Durinodes. Silica-cemented soil aggregates.

Duripan. A subsurface horizon that is cemented by silica to the point that fragments from the air-dry horizon will not slake after prolonged soaking in water or hydrochloric acid.

Effective Rooting Depth. The depth to which a soil is readily penetrated by roots and used for extraction of water and plant nutrients. The classes of effective rooting depth are very deep (more than 60 inches), deep (40 to 60 inches), moderately deep (20 to 40 inches), shallow (10 to 20 inches) and very shallow (less than 10 inches).

Effervescence. The reaction of soil carbonates to 1 Normal hydrochloric acid. The classes of effervescence are slightly, strongly and violently effervescent. Soils with slight effervescence form readily observable gas bubbles; soils with strong effervescence form a low gas foam; and soils with violent effervescence form a thick gas foam, which "jumps" up.

Eluviation. The movement of material from one place to another within the soil, in either true solution or colloidal suspension. Soil horizons that have lost material through eluviation are said to be eluvial, while those that receive material are illuvial.

Eolian. Soil material accumulated through wind action.

Epipedon. A horizon at the soil surface which has been either appreciably darkened by organic matter or eluviated, or, as a minimum, the rock structure has been destroyed. Also see Diagnostic horizons.

Erosion. The wearing away of the land surface by running water, waves, moving ice, wind, or other geologic processes, such as mass wasting or gravitational creep. Also, the detachment and movement of soil or rock. Geologic erosion refers to natural processes occurring over long periods of time. Accelerated erosion is erosion much more rapid than natural geologic erosion, primarily as a result of the influence of the activities of man or, in some cases, of animals.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and produced by erosion or faulting. The steep face frequently presented by the abrupt termination of stratified rocks.

Family, soil. A grouping of soils within a subgroup having similar physical and chemical properties that affect their responses to management and manipulation for use.

Forb. Any herbaceous plant that is not a grass nor a sedge.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry

weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain.

Flood plain. The land bordering a stream, built up of sediments from overflow of the stream and subject to inundation when the stream is at flood stage.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet and fringes a mountain range or high-plateau escarpment.

Frigid Soil Temperature regime. A soil temperature regime that has a mean annual soil temperature lower than 47°F (8°C) and the difference between mean winter and mean summer soil temperature is more than 9° F. (5°C) at a depth of 20 inches (50 centimeters) or at a lithic or paralithic contact, whichever is shallower.

Glacial moraine. See **Moraine**.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, gravel, and boulders transported and deposited by glacial ice.

Granitic rock. Light-colored, coarse-grained rock formed by solidification from a molten or partially molten state.

Granodiorite. A plutonic rock consisting of quartz, calcic oligoclase or andesite, and orthoclase with biotite, hornblende or pyroxene.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 mm. to 7.5 cm.) in diameter. An individual piece is a pebble.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. It is larger than 4 inches (10 centimeters) deep and 6 inches (15 centimeters) wide.

Hard bedrock. See **Lithic Contact**.

Hardpan. Synonymous with **Duripan**.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soils are as follows:

O horizon. An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon. The mineral horizon forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material.

B horizon. The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused by (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) by a combination of these.

C horizon. The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizons. The material of a C horizon may be either like or unlike that in which the solum is presumed to have formed. If the material is known to differ from that in the solum, the number 2 precedes the letter C.

R layer. Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have

Igneous rock. Rock that formed from the cooling and solidification of magma and that has not been changed appreciably since its formation.

Illuviation. The accumulation of material in a soil horizon through the deposition of suspended material and organic matter removed from horizons above. Since part of the fine clay in the B horizon (subsoil) of many soils has moved into the B horizon from the

A horizon above, the B horizon is called an illuvial horizon.

Inclusions. Soils occurring in the map unit that are not identified by their names because the area they occupy is too small.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Lava flow. See **Volcanic flow.**

Limestone. A bedded sedimentary deposit consisting chiefly of calcium carbonate.

Lithic contact. The boundary between soil and continuous, coherent, underlying material (hard rock), which is hard enough to prohibit digging with hand tools and if fractured the pieces are not displaced relative to each other.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Marble. A metamorphic rock composed essentially of calcite and/or dolomite.

Miscellaneous area. An area that has little or no natural soil material capable of supporting vegetation (for example, Rock outcrop).

Mesic soil temperature regime. A soil temperature regime in which the mean annual soil temperature is 47°F. (8°C) or higher but lower than 59° F. (15°C), and the difference between mean summer and mean winter soil temperature is more than 9° F. (5°C) at a depth of 20 inches (50 centimeters) or at a lithic or paralithic contact, whichever is shallower.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition or structure by heat, pressure and movement. Nearly all such rocks are crystalline.

Metasedimentary rock. Sedimentary rock altered in mineralogical composition, chemical composition or structure by heat, pressure and movement.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of an organic soil.

Mollic epipedon. See **Diagnostic horizons**.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (related to a plateau) and generally having steep sides and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Munsell notation. A designation of color by degrees of the three single variables; hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Nutrient, plant. Any element taken in by a plant that is essential to its growth. Plant nutrients are mainly nitrogen, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron and zinc obtained from the soil; and carbon, hydrogen and oxygen obtained from the air and water.

Ochric epipedon. See **Diagnostic horizons**.

Older alluvial fan. An alluvial fan that is a remnant of old landslides or debris flows.

Organic layer. A layer of fresh and decaying plant residue at the surface of a mineral soil.

Organic matter, soil. The organic fraction of the soil including plant and animal residues at various stages of decomposition, cells and tissues of soil organisms, and substances synthesized by organisms living in the soil. Soil organic matter commonly is determined by measuring the amount of organic material in a soil sample passed through a 2-millimeter sieve.

Pachic epipedon. See **Diagnostic horizons**.

Paralithic contact. A boundary between soil and continuous coherent underlying material. If the underlying material is a single mineral, it has a hardness by Moh's scale of less than 3. If it is not a single mineral, chunks of gravel size that can be broken out will disperse more or less completely during 15 hours of end-over-end shaking in water or in sodium

hexametaphosphate solution and, when moist, the material can be dug with difficulty with a spade. There may be cracks in the rock, but the horizontal spacing between cracks should be 10 cm or more.

Parent material. The unconsolidated and more or less chemically weathered mineral or organic matter from which the solum of soils is developed by pedogenic processes.

Particle-size class. The grain-size distribution of the whole soil. It is not the same as texture, which refers to the fine-earth fraction (material 2 mm is smaller). The following are those recognized in this survey area:

Sandy-skeletal. Rock fragments 2 mm in diameter or larger make up 35 percent or more of the soil by volume, there is enough fine earth to fill the interstices larger than 1 mm, and the fraction finer than 2 mm is sandy, as defined for the sandy particle-size class.

Loamy-skeletal. Rock fragments make up 35 percent or more of the soil by volume, there is enough fine earth to fill interstices larger than 1 millimeter, and the fraction finer than 2 millimeters is loamy, as defined for the loamy particle-size class.

Clayey-skeletal. Rock fragments make up 35 percent or more of the soil by volume, there is enough fine earth to fill interstices larger than 1 millimeter and the fraction finer than 2 millimeters is clayey, as defined for the clayey particle-size class.

Sandy. The texture of the fine earth is a sand or loamy sand that is coarser than very fine sand or loamy very fine sand respectively, and rock fragments make up less than 35 percent by volume.

Loamy. The texture of the fine earth is loamy very fine sand, very fine sand or finer, but the amount of clay is less than 35 percent, and the rock fragments are less than 35 percent by volume.

Coarse-loamy. By weight, 15 percent or more of the particles are fine sand (0.25 to 0.1 millimeter in diameter) or coarser, including fragments up to 7.5 centimeters in diameter; and there is less than 18 percent clay in the fine-earth fraction.

Fine-loamy. By weight, 15 percent or more of the particles are fine sand (0.25 to 0.1 millimeters in diameter) or coarser, including fragments up to 7.5 centimeters in diameter; and there is

18 through 34 percent clay in the fine-earth fraction.

Clayey. The fine earth contains 35 percent or more clay by weight, and the rock fragments are less than 35 percent by volume.

Pebble. A fragment of rock, up to 3 inches (7.62 centimeters) in diameter. An individual piece of gravel.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedogenesis. Soil genesis or soil formation; the natural development of horizons. (See Soil formation factors).

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit the study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Pergelic soil temperature regime. A soil temperature regime in which the mean annual soil temperature is lower than 32°F (0°C), at a depth of 20 inches (50 centimeters), or at a lithic or paralithic contact, whichever is shallower.

Permeability. The quality of the soil that enables water to move downward through the profile.

Phase, soil. A subdivision of a soil family or other unit in the soil classification system, based on differences in the soil that affect its use and management but are too small to justify making it a separate taxonomic unit. The phases used in this survey are based on differences in slope, climate, depth, or stoniness. Phases used are:

pH value. A numerical designation of acidity and alkalinity in soil. See **Reaction, soil**.

Plutonic rock. An igneous rock formed at great depth by magmatic crystallization or chemical alteration.

Precipitation, mean annual. The average precipitation received annually by an area. It includes both rainfall and snow.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Pyroclastic rock. Any rock consisting of unreworked solid material of whatever size, explosively or aerially ejected from a volcanic vent.

Quartz monzonite. Synonymous with **Adamellite**.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity (pH) is expressed as:

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum or residual soil material. Unconsolidated, weathered or partly weathered mineral materials accumulated by disintegration of consolidated rock in place.

Rhyolite. The aphanitic (fine rock texture) equivalent of granite.

Rhyolitic tuff. A rock formed from compacted rhyolite fragments, generally less than 4 millimeters in diameter.

Ridge. A long, narrow elevation of the land surface, usually sharp crested with steep sides.

Rill. A steep-sided channel in the soil surface less than 4 inches (10 centimeters) deep and 6 inches (15 centimeters) wide, caused by the washing away of soil material.

Riverwash. Barren alluvial land, usually coarse-textured, exposed along streams at low water and subject to shifting during normal high water. A miscellaneous land type.

Roadcut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters (0.078 inches) or more; in order of increasing size, gravel (pebbles), cobbles, stones, and boulders.

Rubbleland. An area with 90 percent or more surface cover of stones and boulders.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. A cemented or otherwise compacted detrital sediment composed predominantly of quartz grains.

Sediment. Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, or ice, and has come to rest on the earth's surface.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sensitivity. The relative susceptibility of a soil to a decrease of its inherent productivity after being disturbed.

Shale. A sedimentary rock formed by induration of a clay or silty clay deposit and having the tendency to split into thin layers.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. A very fine-grained consolidated clastic rock composed predominantly of particles of the silt grade.

Slate. A fine-grained metamorphic rock possessing a well-developed fissility (slaty cleavage).

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Soft bedrock. See **Paralithic contact**.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil Depth Class. The depth classes used in this survey area are:

Shallow. Less than 20 inches to a lithic or paralithic contact, or a duripan.

Moderately deep. 20 to 40 inches to the contact.

Deep. 40 to 60 inches to the contact.

Very deep. Greater than 60 inches to the contact.

Soil formation factors. The variables - parent material, climate, organisms, topography, and time-active in and responsible for the formation of soil.

Soil pores. That part of the bulk volume of soil not occupied by soil particles; the interstices or voids.

Soil Separates. The individual size-groups of mineral particles. See **Clay, Silt, and Sand**.

Soil survey. The systematic examination, description, classification, and mapping of soils in an area. Soil surveys are classified according to the kind and intensity of field examination.

Soil Temperature regimes. Are based on mean annual soil temperature and difference between mean summer and mean winter temperature. Soil temperature is determined at a depth of 20 inches (50 cm) or at a lithic or paralithic contact, whichever is shallower. Unless indicated in a higher category, soil temperature classes are used at the family level. See **Mesic, Frigid, Cryic and Pergelic soil temperature regimes**.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are

active. The solum in mature soils consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Strata. Layers in sedimentary rock formations.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. The soil structure grades are structureless, weak, moderate, and strong. Structureless soils are either single grained (noncoherent) or massive (coherent).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "A horizon."

Talus. Fragments of rock and other soil material accumulated at the foot of cliffs or steep slopes.

Temperature, mean annual. The average air temperature of an area on a yearly basis.

Temperature, mean annual soil. The average soil temperature at a depth of 20 inches (50 centimeters), on a yearly basis.

Temperature, mean summer soil. The average soil temperature at a depth of 20 inches (50 centimeters), for the months of June, July and August.

Temperature, mean winter soil. The average soil temperature at a depth of 20 inches (50 centimeters), for the months of December, January and

February.

Temperature regimes, soil. See **Thermic, Mesic, Frigid, Cryic and Pergelic soil temperature regimes.**

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine." See **Clay, Silt and Sand.**

Texture modifier. Adjective included in a soil textural class name, based on the percentage of rock fragments in the soil. Examples:

Gravelly	15 to 35 percent
Very gravelly	35 to 60 percent
Extremely gravelly	over 60 percent

Thermic soil temperature regime. A soil temperature regime that has mean annual soil temperature of 59° F. (15°C) or higher but lower than 72° F. (22°C), and the difference between mean summer and mean winter soil temperatures is more than 9° F (5°C) at a depth of 20 inches (50 centimeters) or at a lithic or paralithic contact, whichever is shallower.

Till plain. An extensive flat to undulating area underlain by glacial till.

Toeslope. The geomorphic component that forms the outermost, gently-inclined surface at the base of a mountainside.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Upland basin. A nearly level to gently sloping depressed area in mountains with limited or no surface outlet.

Volcanic flow. A mass of deep-seated igneous material extruded onto the earth's surface typically forming a gently to moderately sloping, relatively flat incline.

Volcanic rock. The class of igneous rocks that have been poured out or ejected at or near the earth's surface.

Water table. The upper surface of ground water or that level in the ground where water is at atmospheric pressure.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Wilting point. The moisture content of soil, on an oven-dry basis, at which a plant wilts so much that it does not recover when placed in a humid, dark chamber.

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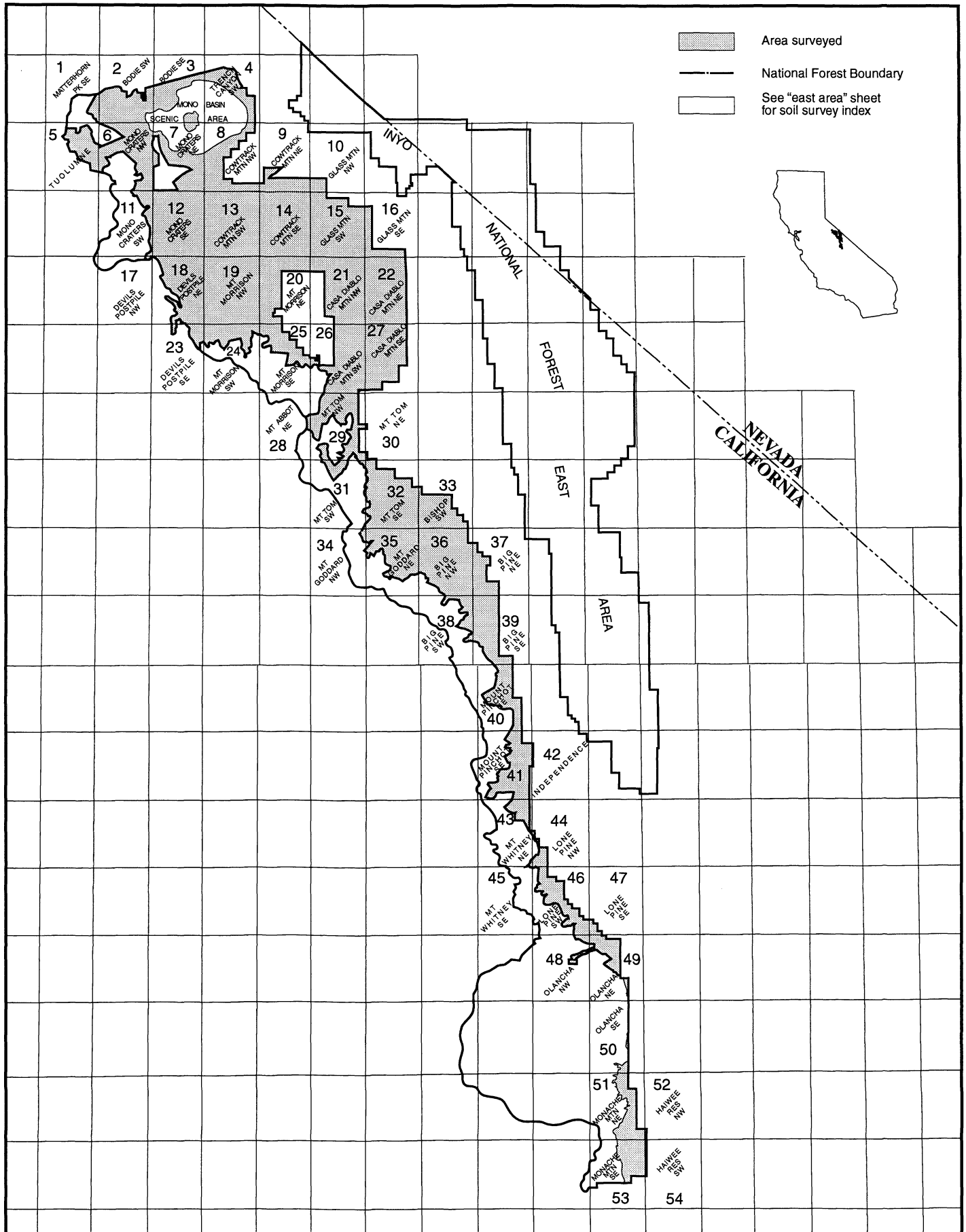
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1995



INYO NATIONAL FOREST AREA - WEST PART
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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

MATTERHORN PEAK SE QUADRANGLE
MT DIABLO MERIDIAN
TUOLUMNE MONO CO. CALIFORNIA
7.5 MINUTE SERIES

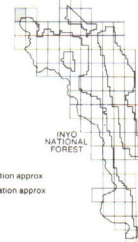


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Topography by photogrammetric methods from aerial photographs
Map edited 1960
Polyconic projection, 1927 North American datum
10,000 foot grid based on California coordinate system zone 3
1000 metre Universal Transverse Mercator and ticks zone 11
INTERIM EDITION
Photorevised by the Geomatics Service Center in 1984
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Trail
Locked Gate
Barrier
Railroad

US Highway
State Highway
County Road
Forest Highway
Forest Road
Forest Trail
Forest Service Trail location approx
Forest Service Road location approx

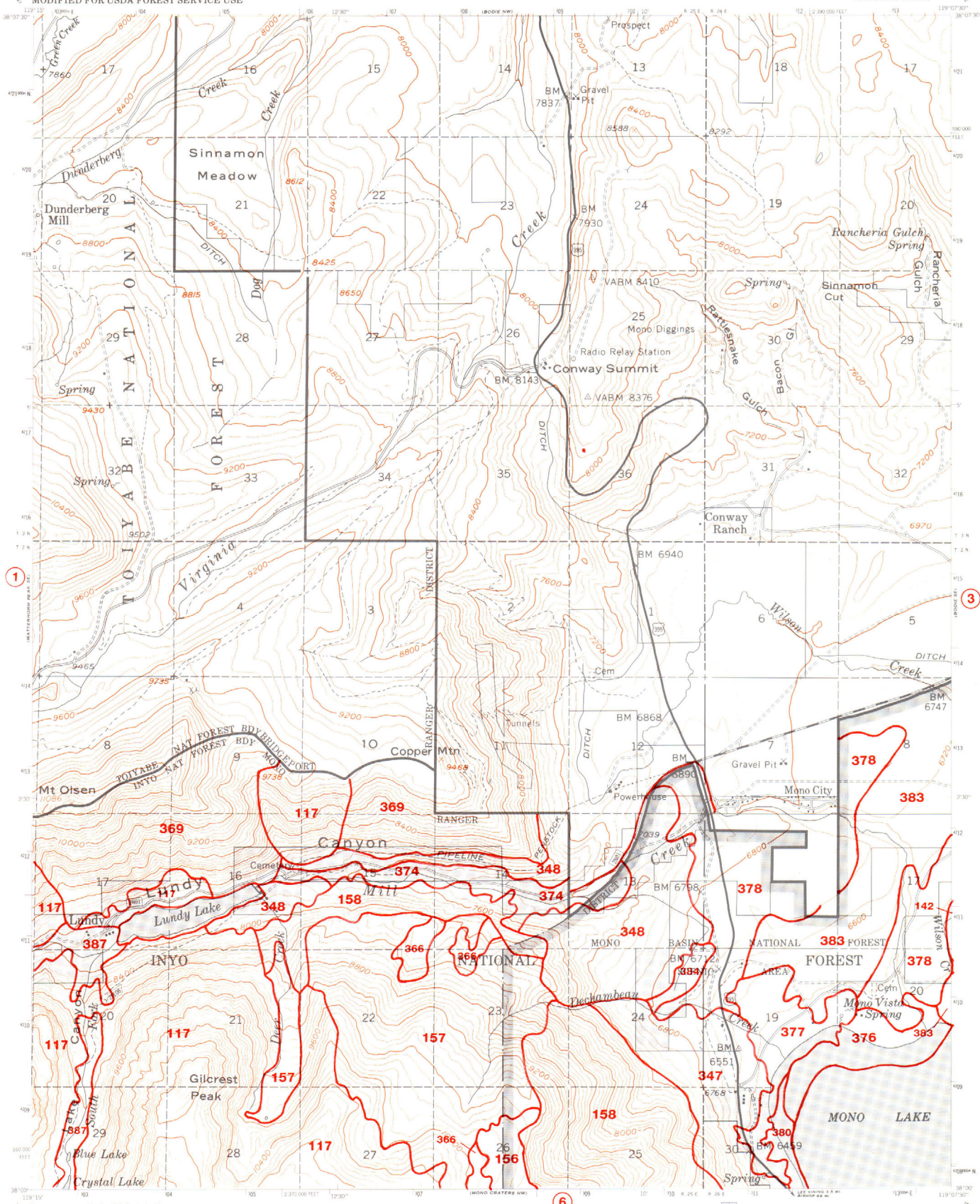


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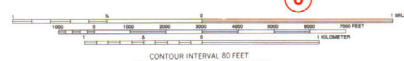
INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

UNITED STATES
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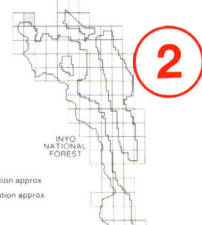
BODIE SW QUADRANGLE
MT DIABLO MERIDIAN
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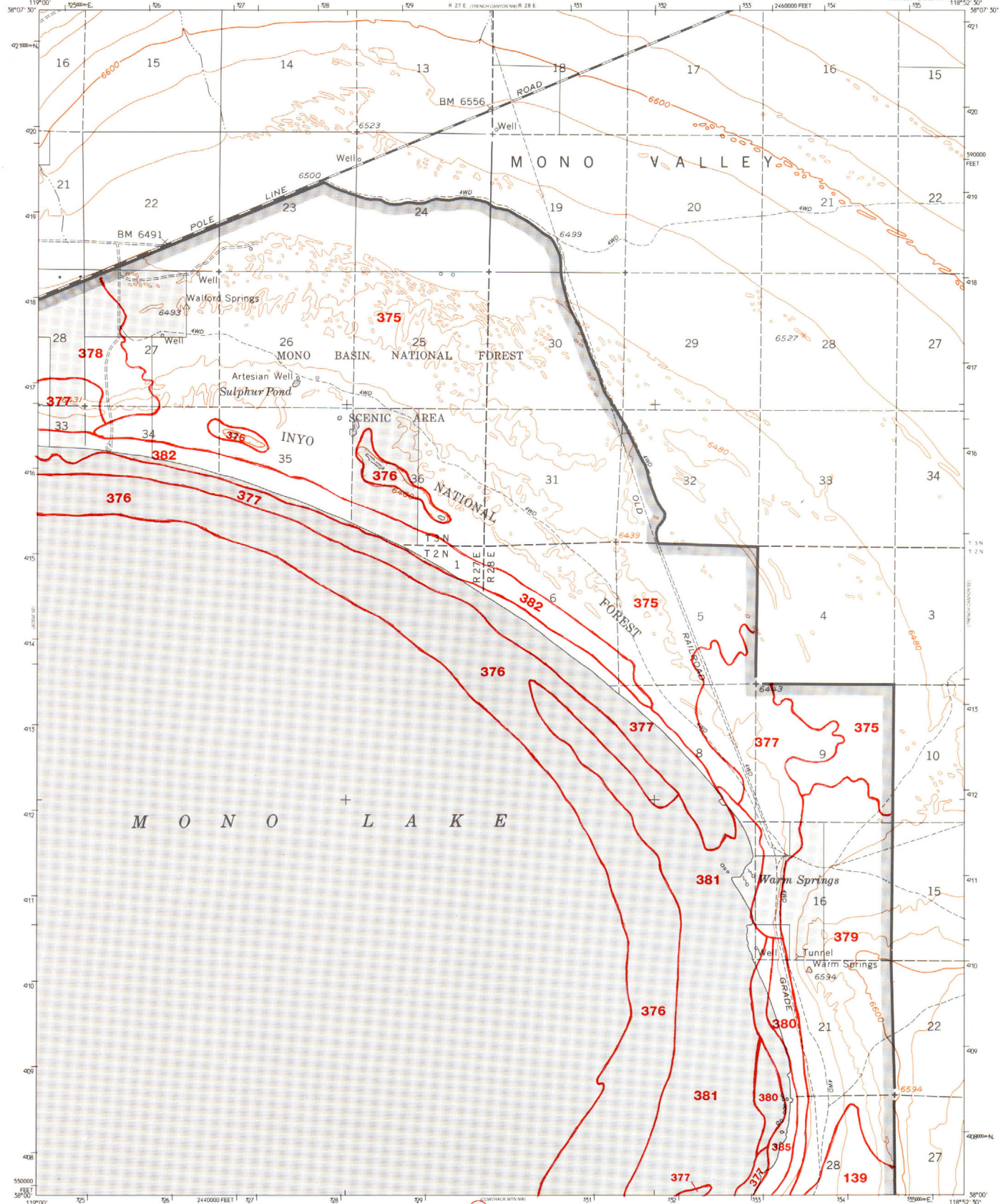
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(470-3C)
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BODIE SE, CALIFORNIA
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(470-4C)
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INYO NATIONAL FOREST AREA - WEST PART
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TRENCH CANYON SW QUADRANGLE
MT. DIABLO MERIDIAN
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UTM GRID AND 1984 MAGNETIC NORTH
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Landnet revised according to additional Forest Service evidence

City of Los Angeles Land

Withdrawn BLM Land

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

LEGEND

Primary Highway

Secondary Highway

Improved Light Duty

Unimproved Dirt

Trail

Locked Gate

Barrier

Railroad

Withdrawn BLM Land

US Highway

State Highway

County Road

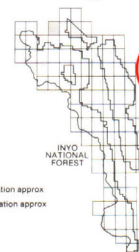
Forest Highway

Forest Road

Forest Trail

Forest Service Trail location approx

Forest Service Road location approx



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TRENCH CANYON SW, CALIFORNIA

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(469-3C)

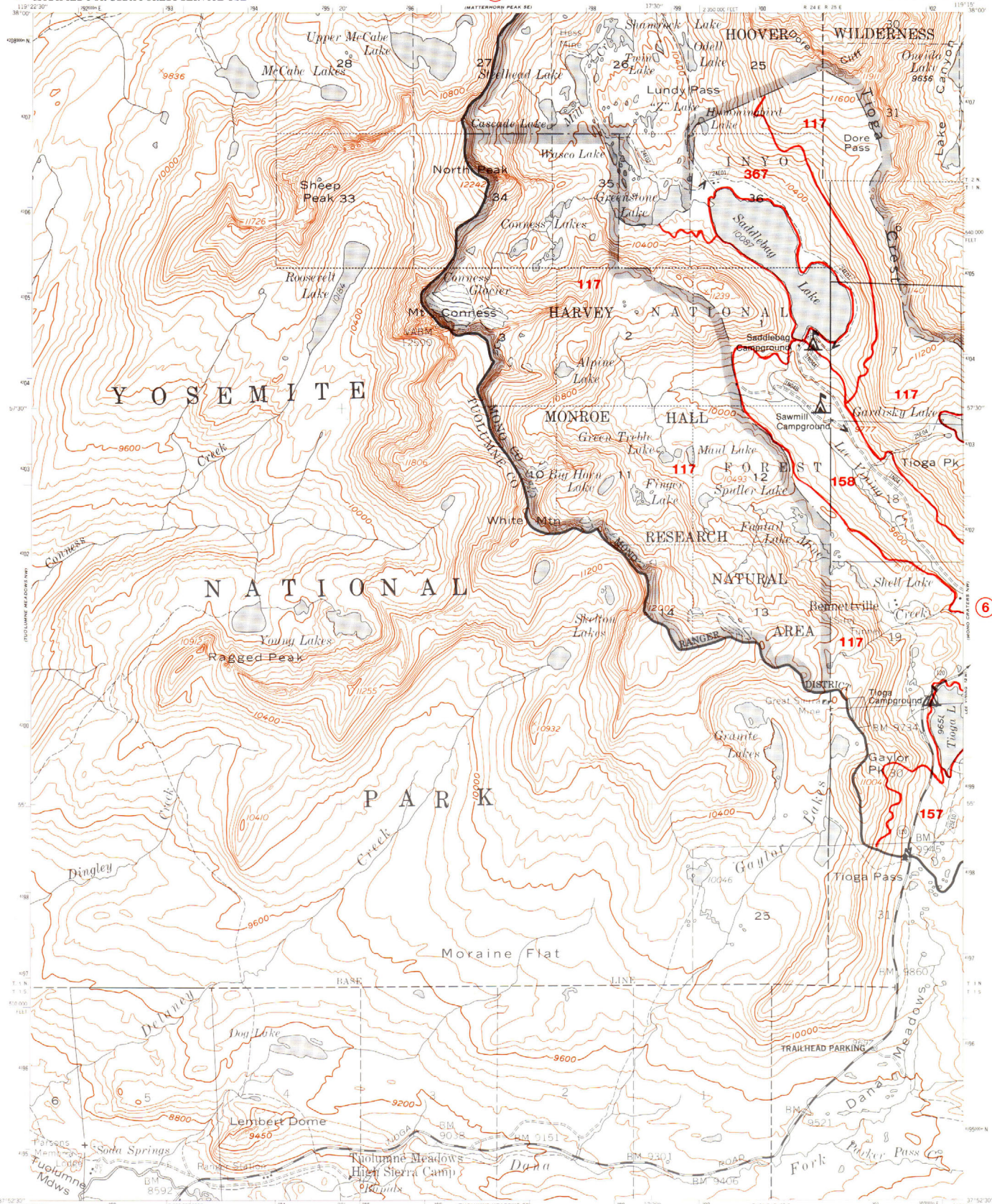
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INYO NATIONAL FOREST AREA - WEST PART
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TUOLUMNE MEADOWS NE QUADRANGLE
MT DIABLO MERIDIAN
MONO CO., CALIFORNIA
7.5 MINUTE SERIES

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TUOLUMNE MEADOWS NE, CALIF
N7352.5-W11915.7.5
(454-10)
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MONO CRATERS NW QUADRANGLE
MT DIABLO MERIDIAN
MONO CO., - TUOLUMNE CO., CALIFORNIA
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revised according to additional Forest Service evidence

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US Highway
State Hwy
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Forest Rd
Forest St

INYO NATIONAL FOREST

on approx
on approx

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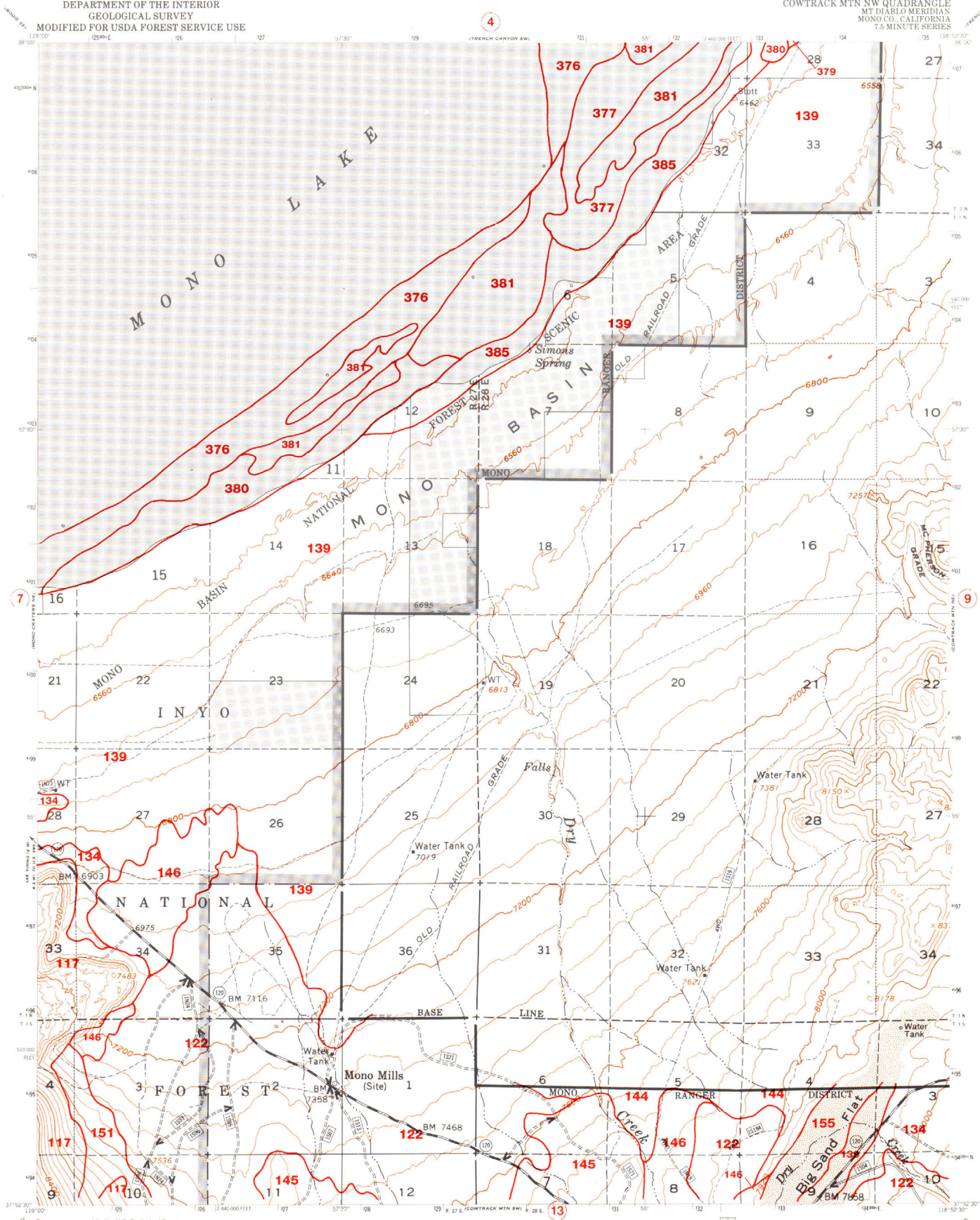
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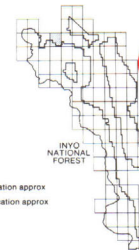
COWTRACK MTN NW QUADRANGLE
MT DIABLO MERIDIAN
MONO CO. CALIFORNIA
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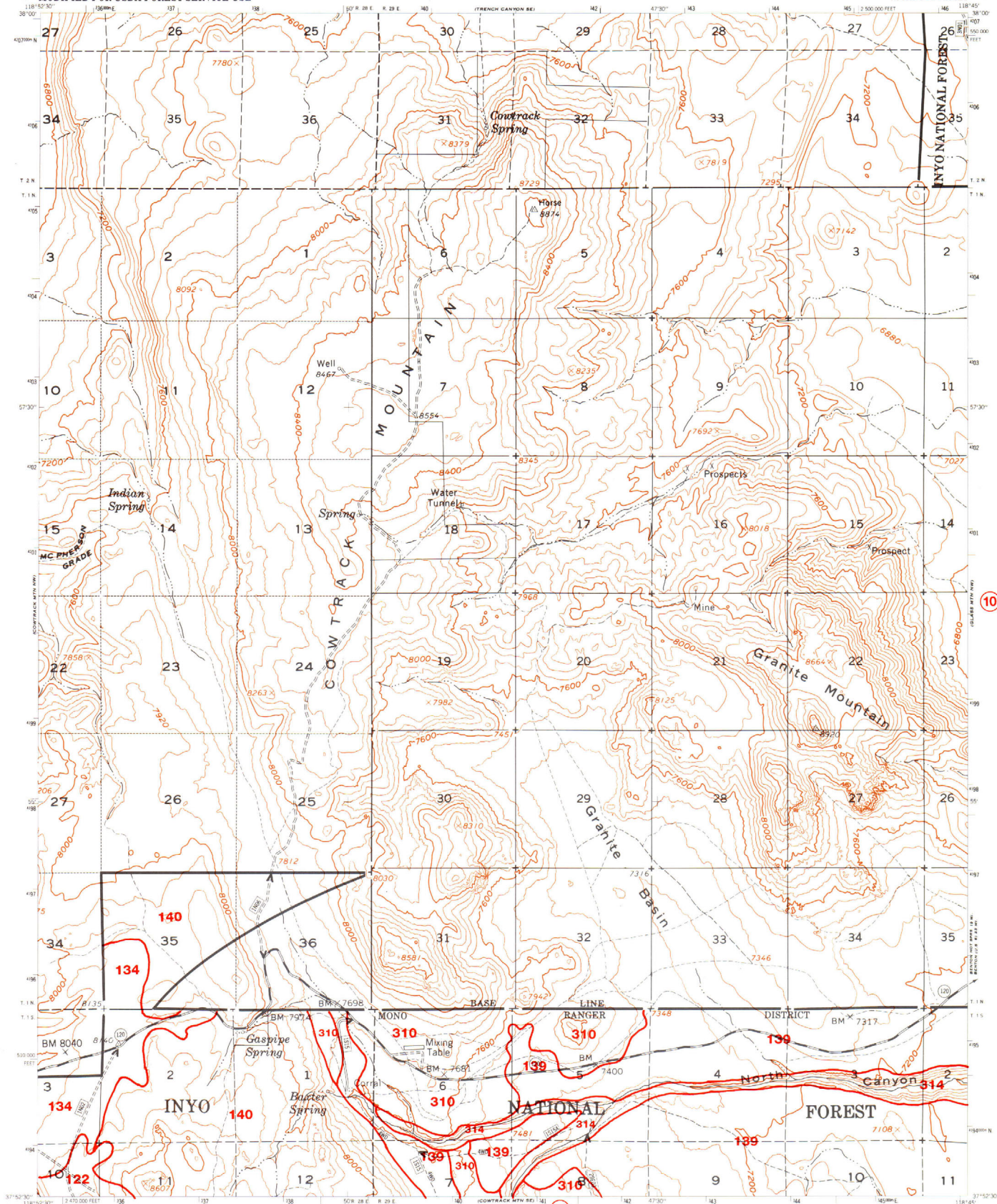
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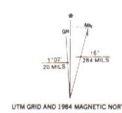
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COWTRACK MTN NE QUADRANGLE
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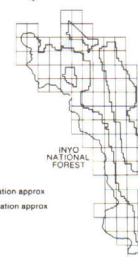


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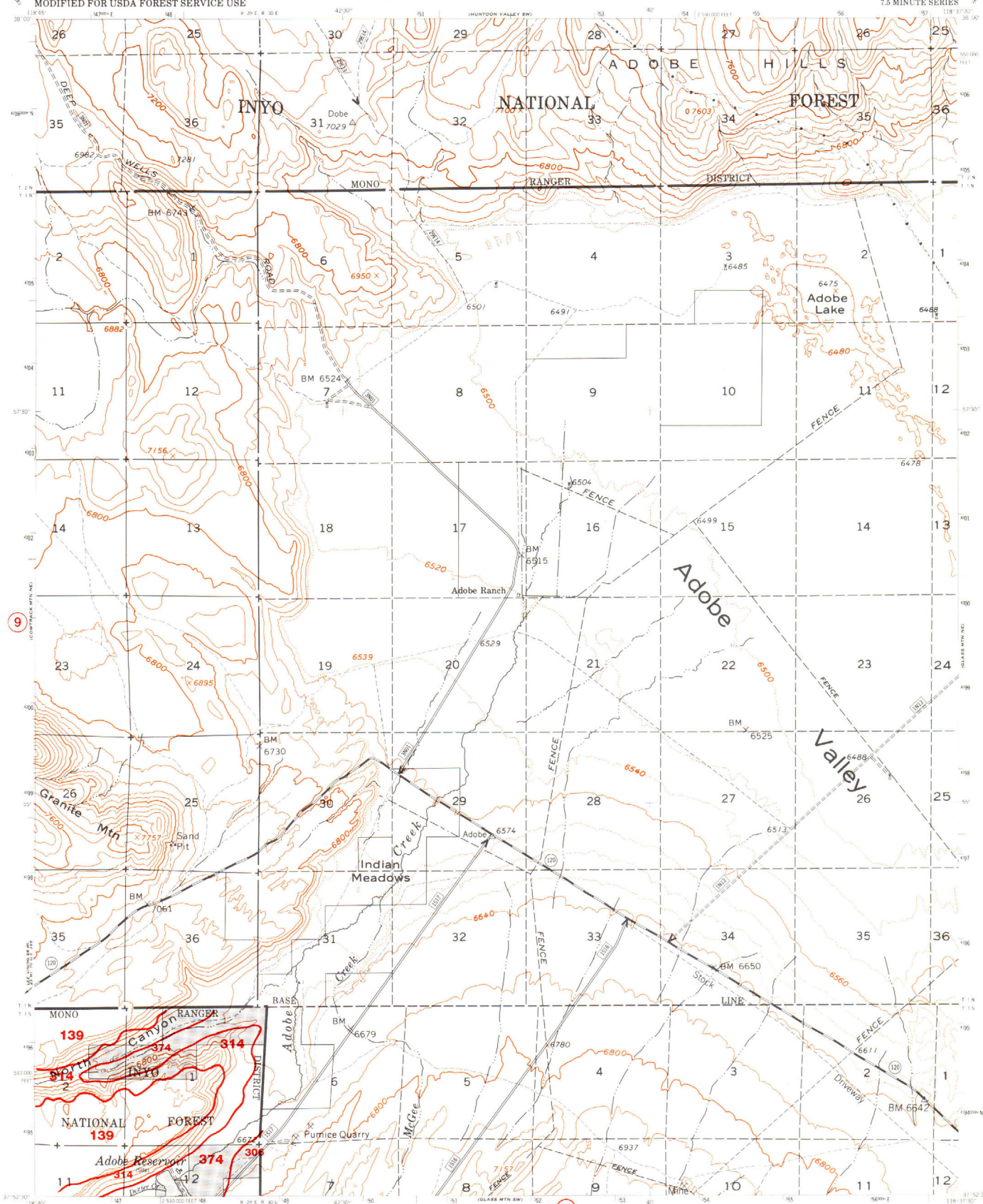
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COWTRACK MTN NE, CALIF
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GLASS MTN NW QUADRANGLE
MT DIABLO MERIDIAN
MONO, CALIFORNIA
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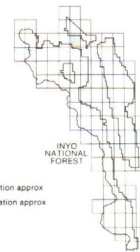


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Forest Service Road location approx



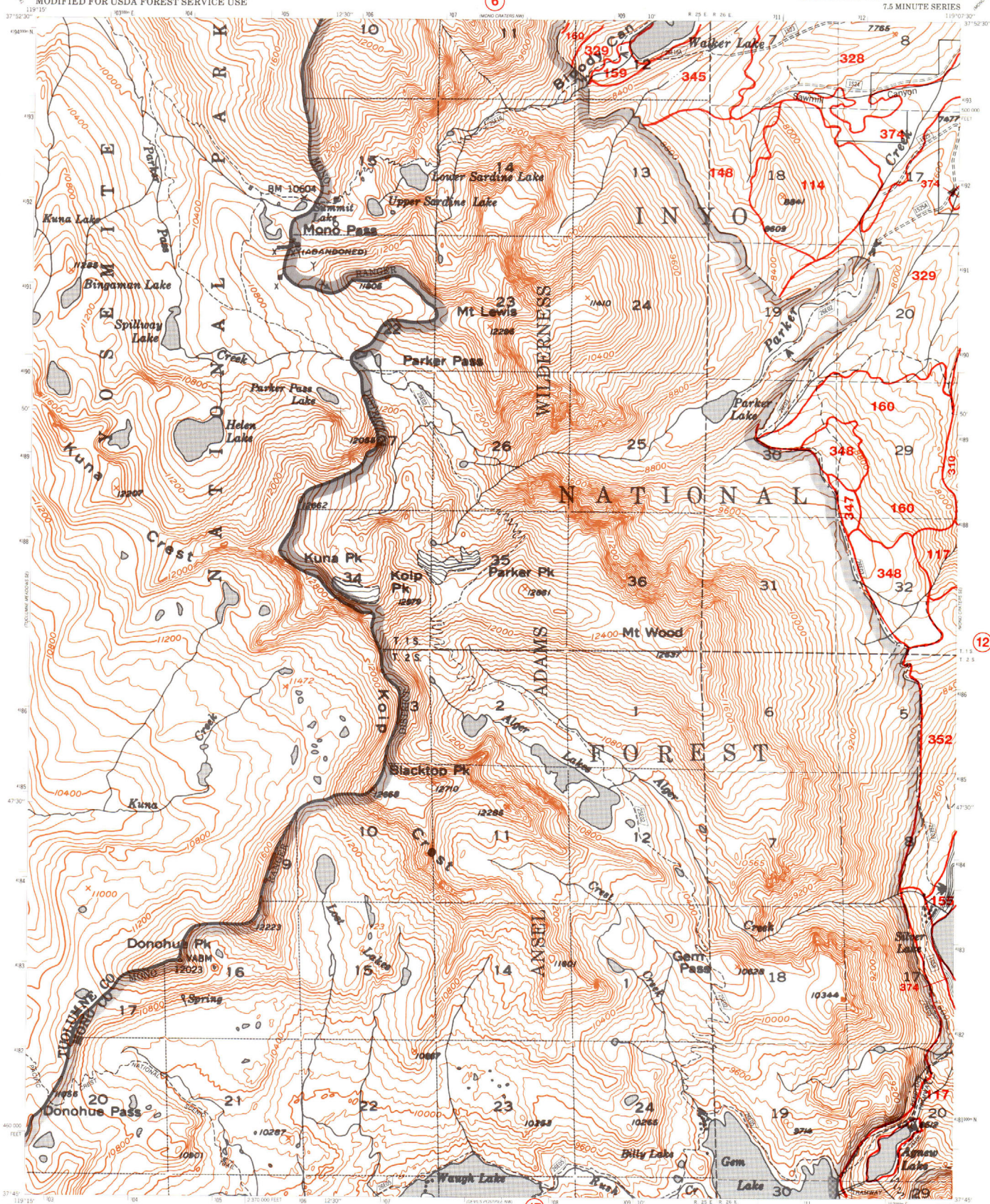
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GLASS MTN NW CALIF
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MONO CRATERS SW QUADRANGLE
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Railroad

Withdrawn BLM Land

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MONO CRATERS SW, CALIF

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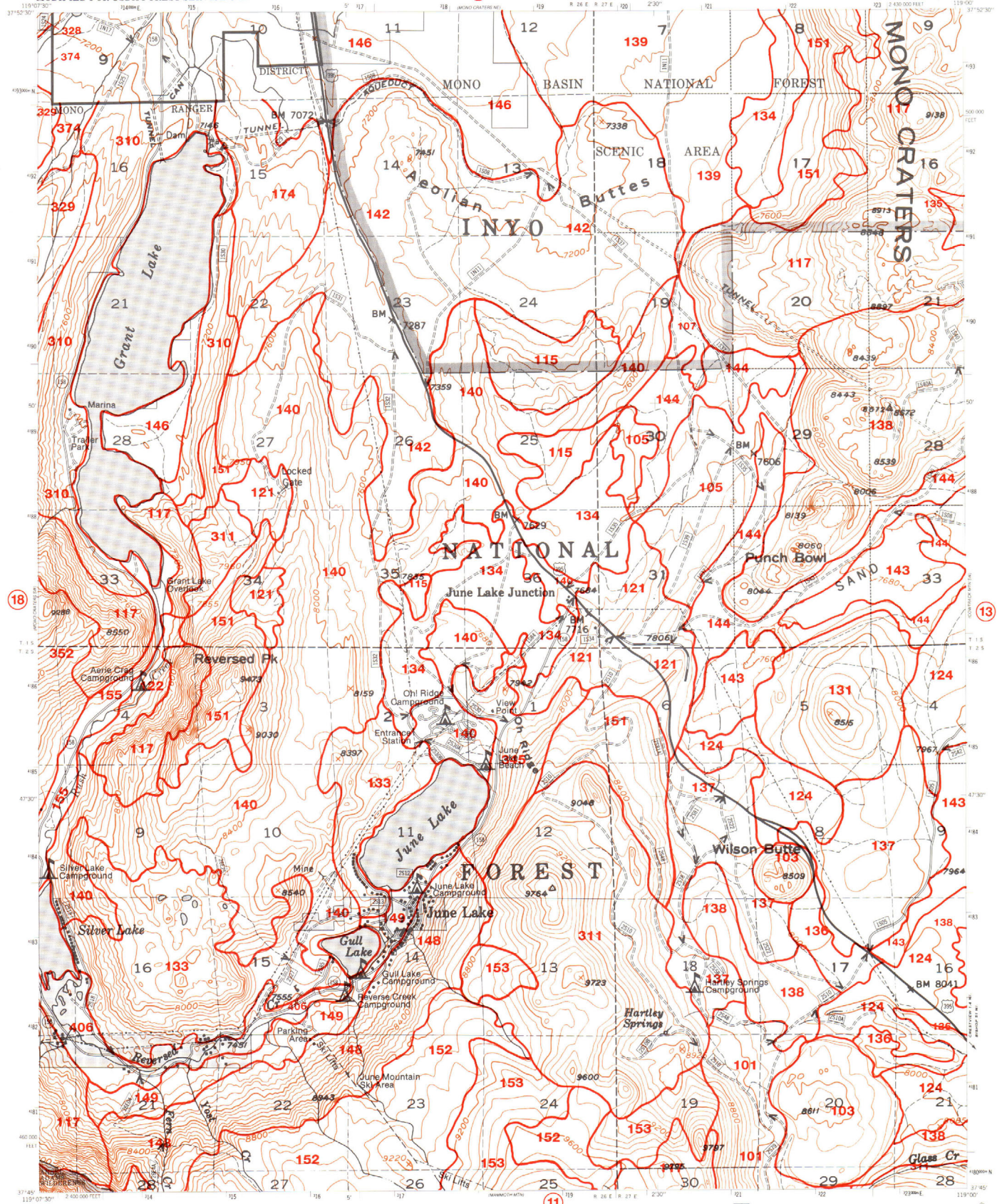
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INYO NATIONAL FOREST AREA - WEST PART
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Polyconic projection. 1927 North American datum
10,000-foot grid based on California coordinate system zone 3
1000 metre Universal Transverse Mercator grid ticks zone 11
INTERIM EDITION
Photorevised by the Geomatics Service Center in 1984
from USFS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region

UTM GRID AND 1984 MAGNETIC NORTH

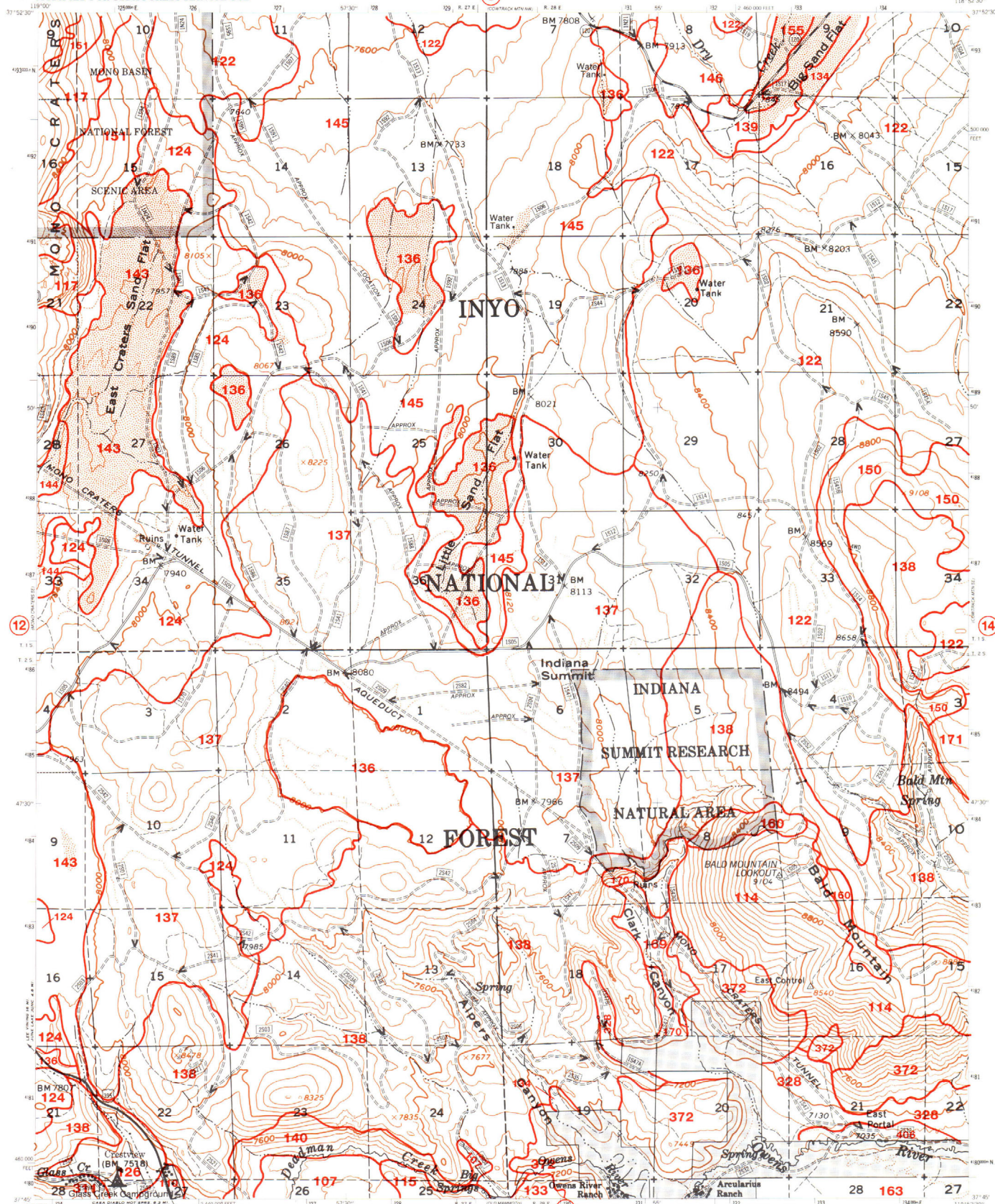
CONTOUR INTERVAL: 80 FEET
NATIONAL GEOGRAPHIC VERTICAL DATUM OF 1929

LEGEND

—	National Forest Boundary	—	Primary Highway
—	Altered Land within the Forest Boundary as of 1984	—	Secondary Highway
TOWNSHIP AND SECTION LINE CLASSIFICATION		—	Improved Light Duty
—	Surveyed, Location Reliable	—	Unimproved Dirt
—	Surveyed, Location Approximate	—	Trail
—	Unsurveyed, Protection	—	Latched Gate
—	revised according to additional Forest Service evidence	—	Barrier
—	City of Los Angeles Land	—	Railroad
—		—	Withdrawn BLM Land

 US Highway
 State Highway
 County Road
 Forest Highway
 Forest Road
 Forest Trail
 Forest Service Trail location approx

MONO CRATERS SE, CALIF
N3745-W11900/7.5
(453-4C)
REVISED 1984



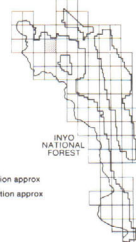
Base map prepared by the U.S. Geological Survey
Topography by photogrammetric methods from aerial photographs
Map dated 1967
Polyconic projection, 1927 North American datum
10,000-foot grid based on California coordinate system zone 3
1000-metre Universal Transverse Mercator grid ticks zone 11
INTERIM EDITION
Photorevised by the Geomatics Service Center in 1984
from USFS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region

UTM GRID AND 1984 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

LANDNET revised according to additional Forest Service evidence

LEGEND

- National Forest Boundary
- Altered Land within the Forest Boundary as of 1984
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Approximate
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Light Duty
- Trail
- Locked Gate
- Barrier
- Railroad
- US Highway
- State Highway
- County Road
- Forest Road
- Forest Trail
- Forest Service Trail location approx
- Forest Service Road location approx

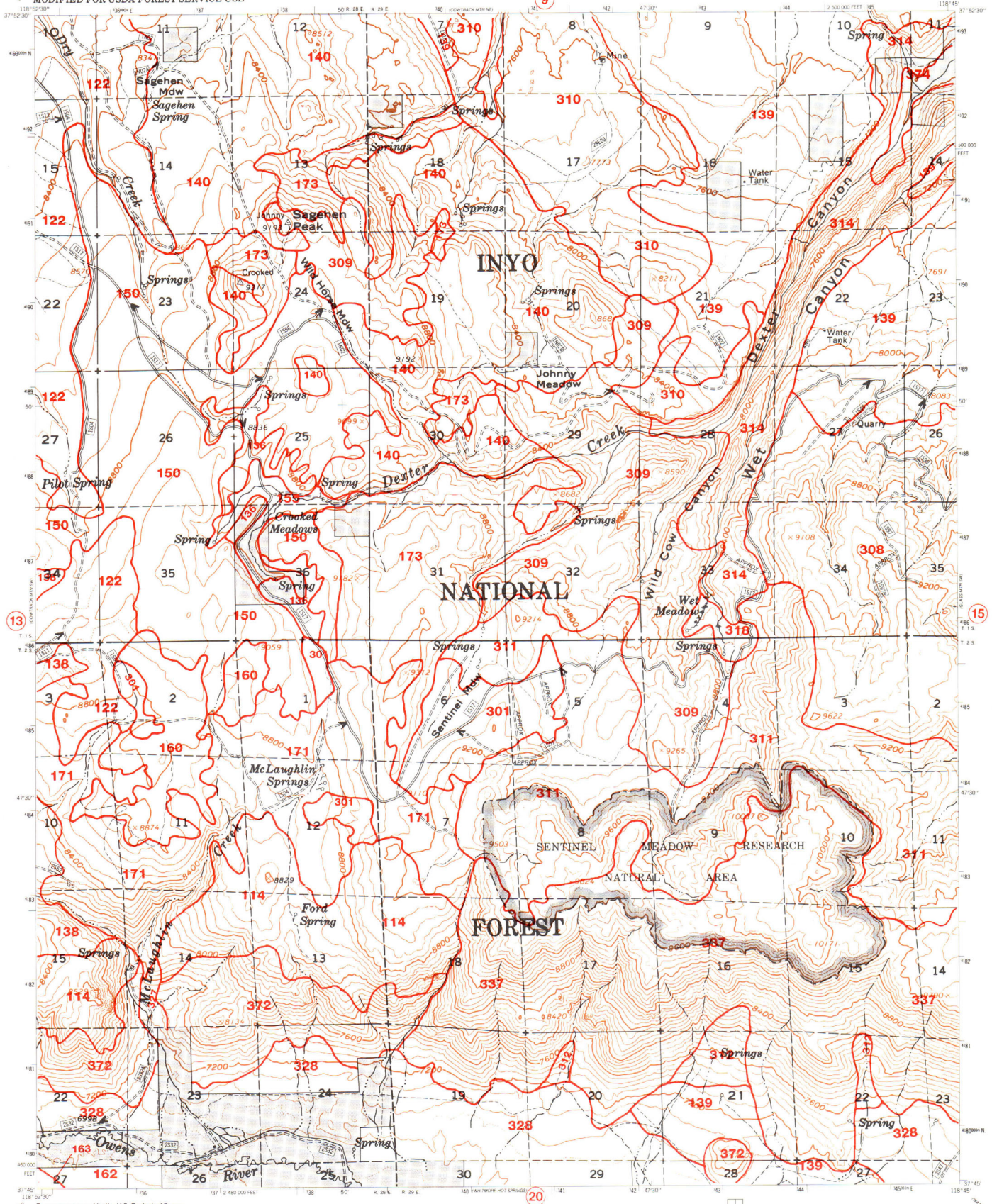


13

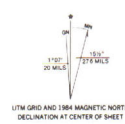
INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

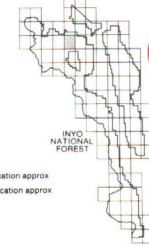
COWTRACK MTN SE QUADRANGLE
MT DIABLO MERIDIAN
MONO CO. CALIFORNIA
7.5 MINUTE SERIES



Base map prepared by the U.S. Geological Survey
Topography by photogrammetric methods from aerial photographs
Map edited 1982
Polyconic projection. 1927 North American datum
10,000 foot grid based on California coordinate system zone 3
1000 metre Universal Transverse Mercator grid ticks zone 11
INTERIM EDITION
Photorevised by the Geomatics Service Center in 1984
from USFS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region



- LEGEND
- National Forest Boundary
 - Alienated Land within the Forest Boundary as of 1984
 - TOWNSHIP AND SECTION LINE CLASSIFICATION
 - Surveyed, Location Reliable
 - Surveyed, Location Approximate
 - Unsurveyed, Protraction
 - Landmark revised according to additional Forest Service evidence
 - City of Los Angeles Land
 - Withdrawn BLM Land
 - Primary Highway
 - Secondary Highway
 - Improved Light Duty
 - Unimproved Dirt
 - Trail
 - Locked Gate
 - Barrier
 - Railroad
 - US Highway
 - State Highway
 - County Road
 - Forest Highway
 - Forest Road
 - Forest Trail
 - Forest Service Trail location approx
 - Forest Service Road location approx



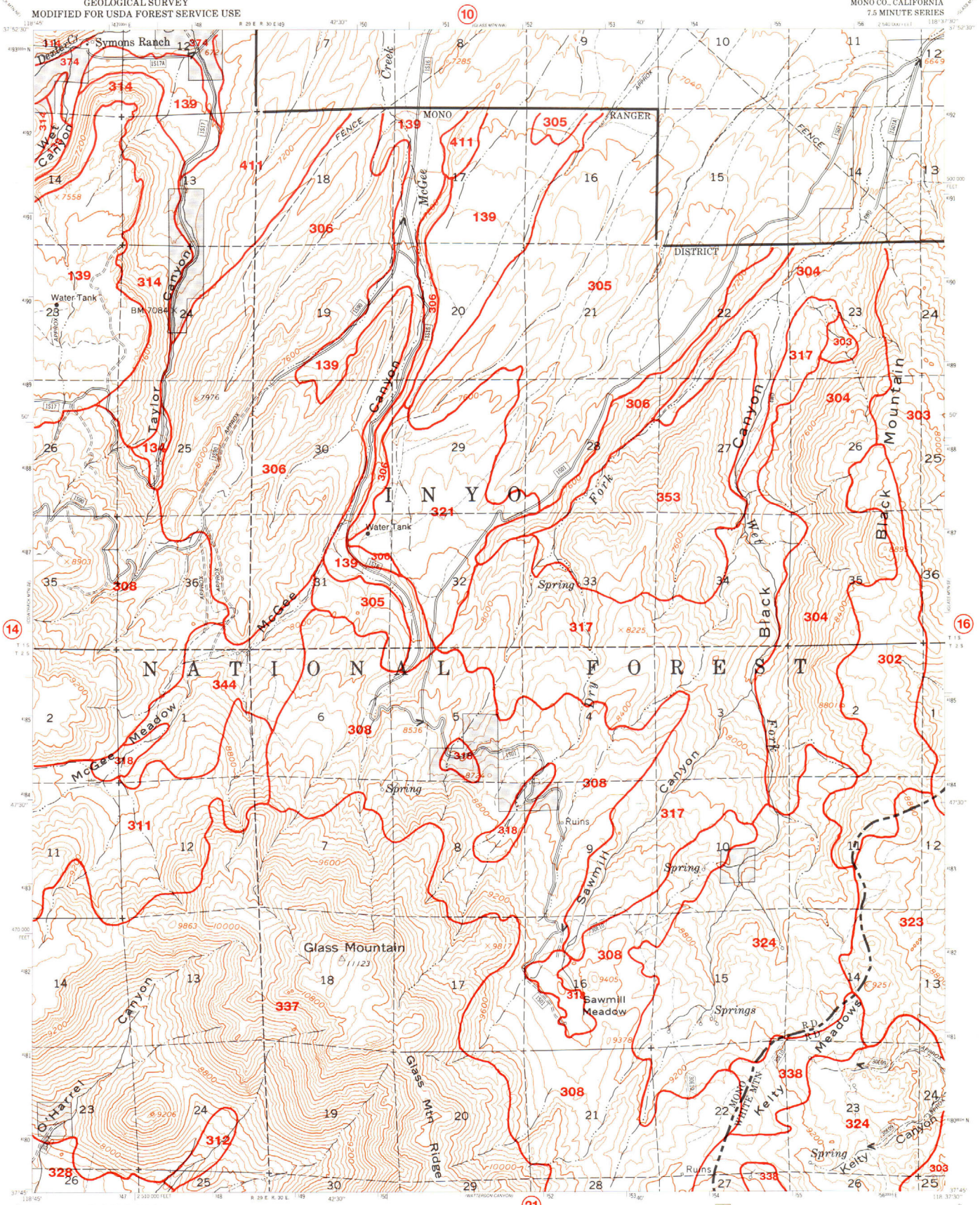
14

COWTRACK MTN SE, CALIF
NTLAS W118457.5
(452-4C)
REVISED 1984

INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

GLASS MTN SW QUADRANGLE
MT DIABLO MERIDIAN
MONO CO. CALIFORNIA
7.5 MINUTE SERIES

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE



Base map prepared by the U.S. Geological Survey
Topography by photogrammetric methods from aerial photographs
Map edited 1982
Polyconic projection 1927 North American datum
10,000-foot grid based on California coordinate system zone 3
1000 metre Universal Transverse Mercator grid ticks zone 11
INTERIM EDITION
Photorevised by the Geomatics Service Center in 1984
from USGS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region

UTM GRID AND 1984 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

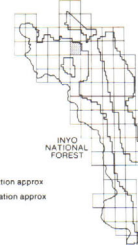
CONTOUR INTERVAL 80 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

LEGEND

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Locked Gate
Barrier
Railroad
Withdrawn BLM Land

TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed Location Reliable
Surveyed Location Approximate
Unsurveyed Protection
Landset revised according to additional Forest Service evidence
City of Los Angeles Land

US Highway
State Highway
County Road
Forest Highway
Forest Road
Forest Trail
Forest Service Trail location approx
Forest Service Road location approx



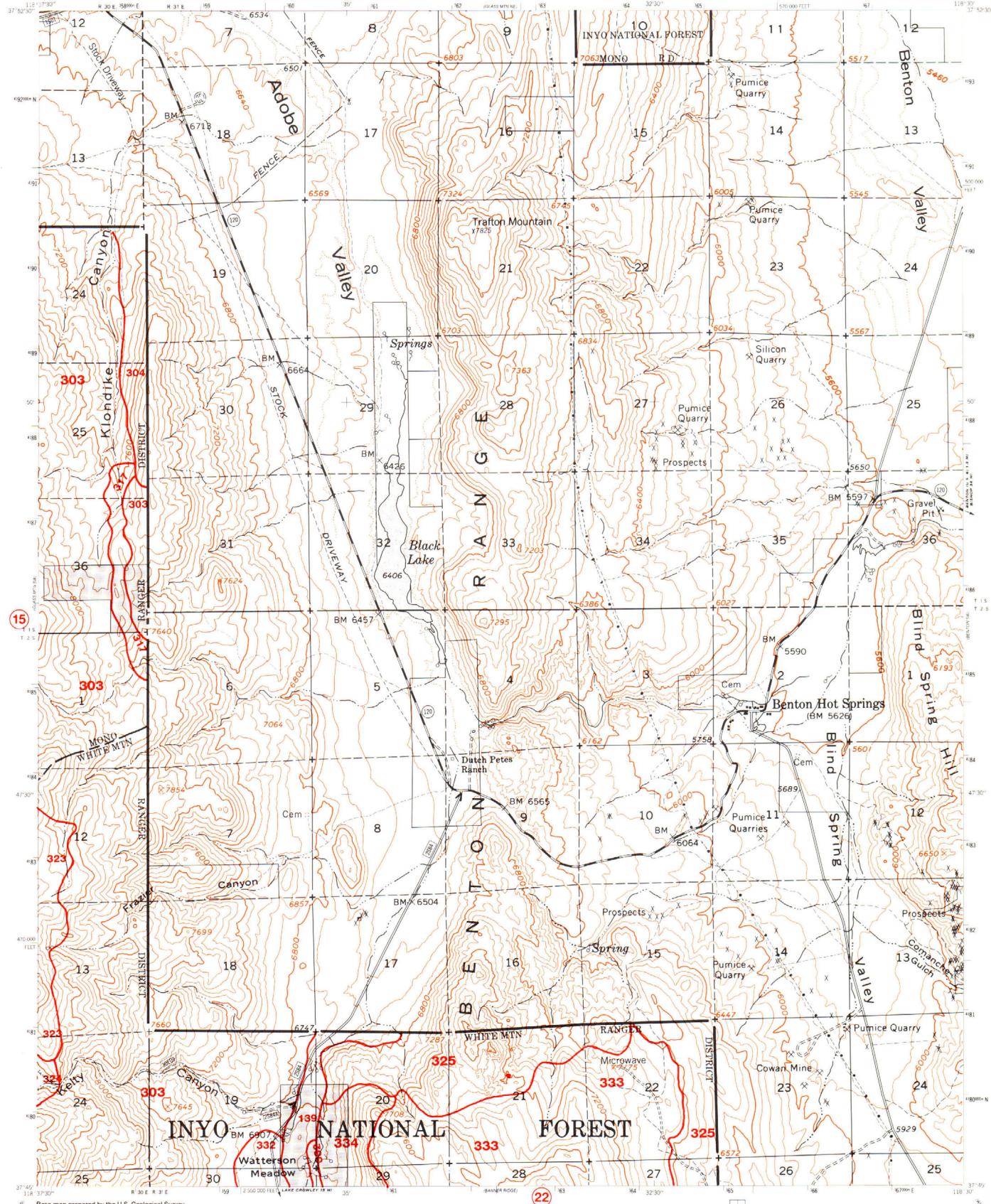
15

GLASS MTN SW, CALIF
N3745-W1837.5-7.5
(451-3C)
REVISED 1984

INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

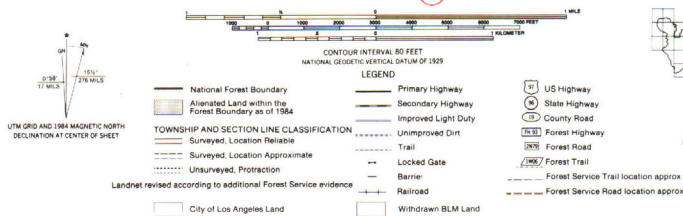
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

GLASS MTN SE QUADRANGLE
MT DIABLO MERIDIAN
MONO CO., CALIFORNIA
7.5 MINUTE SERIES



Base map prepared by the U.S. Geological Survey
Topography by photogrammetric methods from aerial photographs
Map edited 1962
Polyconic projection, 1927 North American datum
10,000-foot grid based on California coordinate system zone 3
1000-meter Universal Transverse Mercator grid ticks zone 11
INTERIM EDITION

Photorevised by the Geomorphics Service Center in 1984
from USFS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region



16

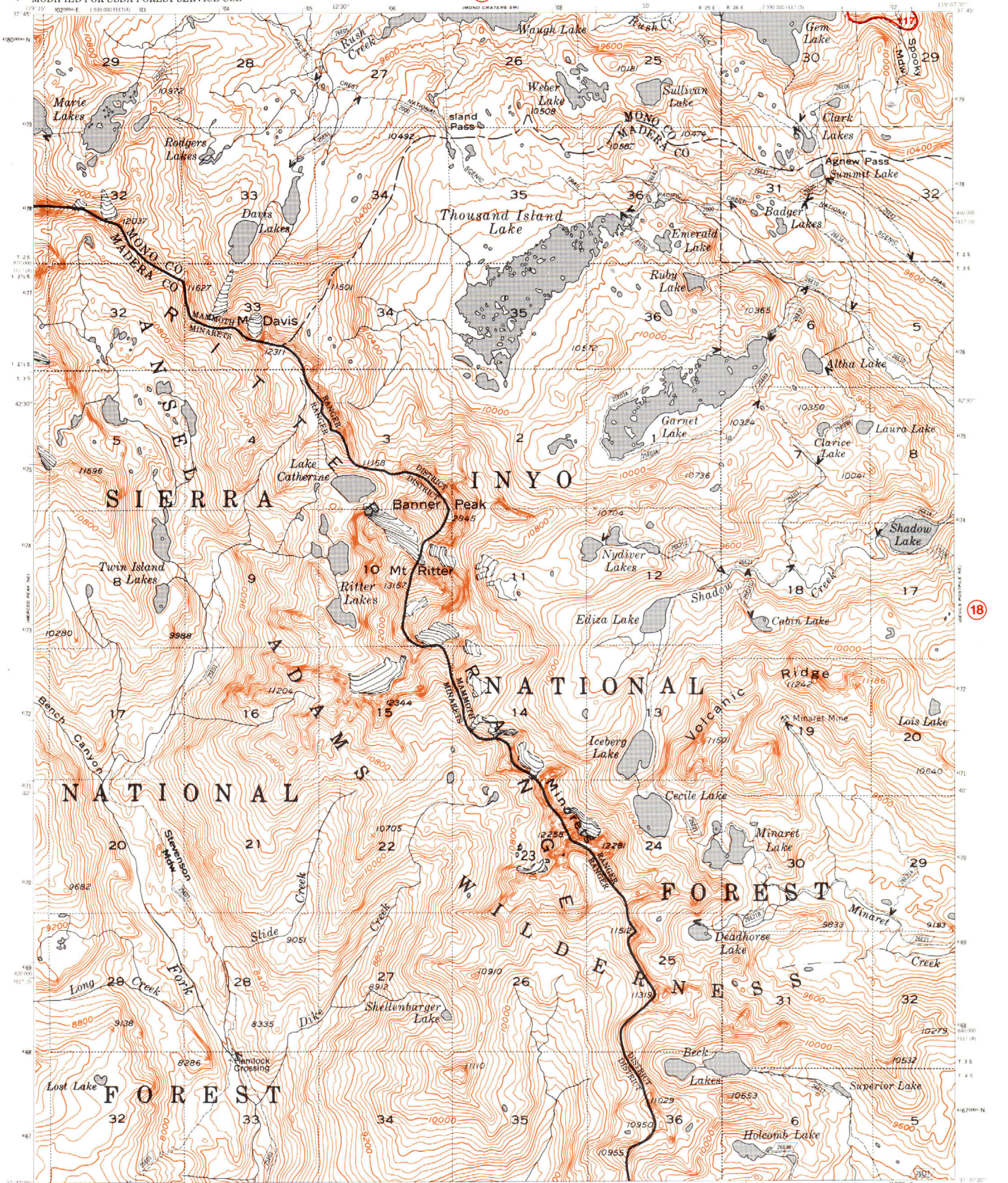
GLASS MTN SE, CALIF
N1745-W11830-7.5
(451-4C)
REVISED 1984

INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

DEVILS POSTPILE NW QUADRANGLE
MT DIABLO MERIDIAN
MADERA - MONO CO. CALIFORNIA
7.5 MINUTE SERIES

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

(11)



Base map prepared by the U.S. Geological Survey
Control by USGS and USCGS
Topography by photogrammetric methods from aerial photographs
taken 1952. Field checked 1953.
Polyconic projection 1927 North American datum
10,000 foot grid based on California coordinate system zone 3 and 4
1000-meter Universal Transverse Mercator grid ticks zone 11
INTERIM EDITION
Modification to USGS base map by the Geomatrix Service
Center from USFS aerial photography and 1978 correction guides
Photorevised by the Geomatrix Service Center in 1984 from
USFS 1982 1:12,000 and 1:24,000 aerial photographs and 1984
correction guides furnished by the Pacific Southwest Region.

UTM GRID AND 1984 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

Legend
National Forest Boundary
Alluvial Land within the
Forest Boundary as of 1984
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Approximate
Unsurveyed, Protraction
Landnet revised according to additional Forest Service evidence

Legend
Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Locked Gate
Barrier
Railroad

Legend
US Highway
State Highway
County Road
Forest Highway
Forest Road
Forest Service Trail location approx
Forest Service Road location approx



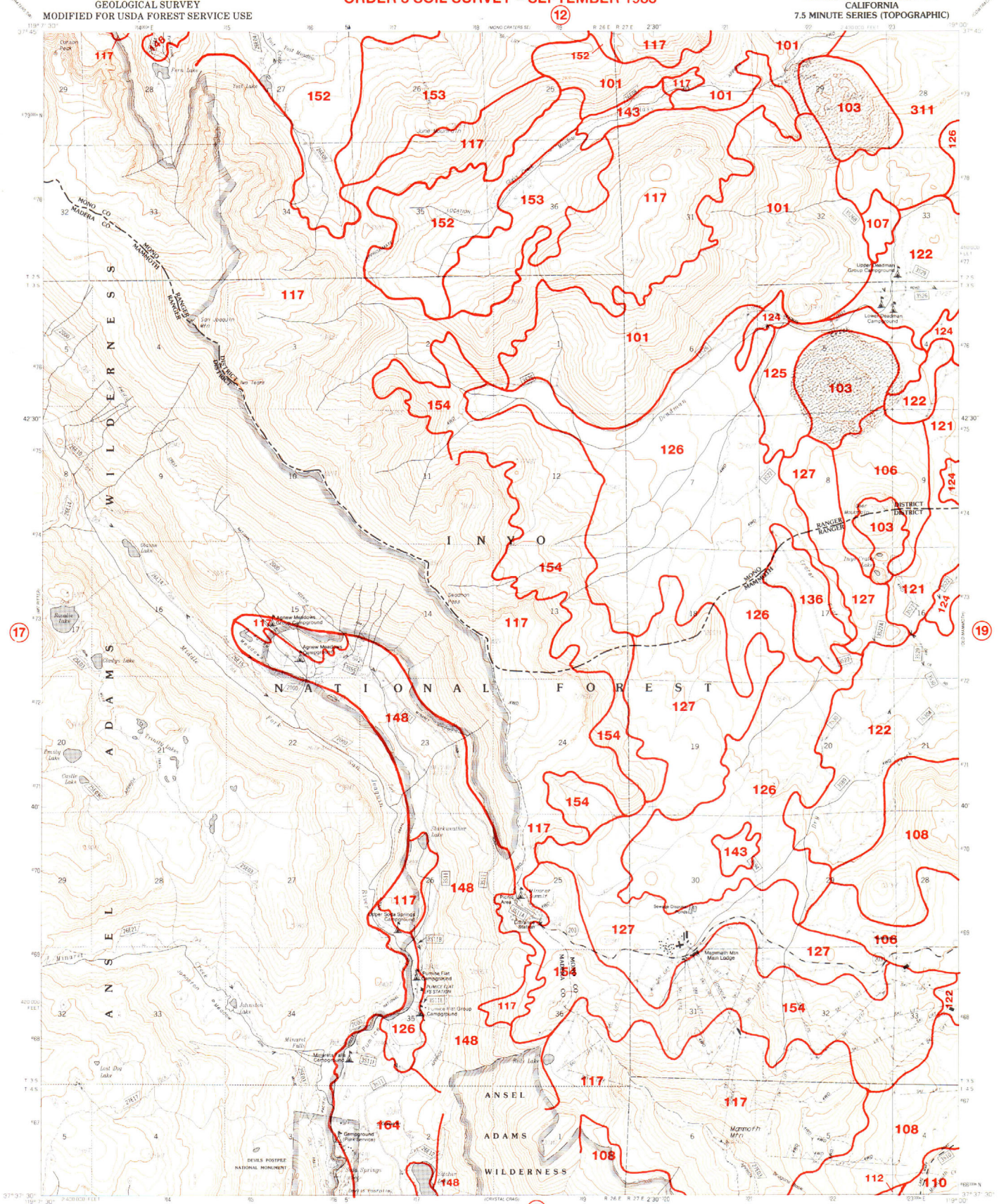
(17)

DEVILS POSTPILE NW, CALIF.
N7172 & W1907.5-7.5
(435-2C)

REVISED 1984

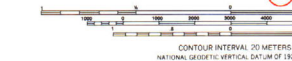
INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

MAMMOTH MTN. QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)



Base map prepared by the U.S. Geological Survey
CONTOUR INTERVAL: 20 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
TO PLACE ON THE PREDICTED NORTH AMERICAN DATUM OF 1983,
move the projection lines as shown by dashed corner ticks
(11 meters north, 85 meters east)
Photorevised by the Geomatics Service Center in 1984
from USGS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region

UTM GRID AND 1984 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



CONTOUR INTERVAL: 20 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

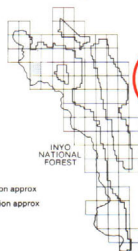
TOWNSHIP AND SECTION LINE CLASSIFICATION

Surveyed, Location Reliable
Surveyed, Location Approximate
Unsurveyed, Protection
Landred revised according to additional Forest Service evidence

LEGEND

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Locked Gate
Barrier
Railroad

US Highway
State Highway
County Highway
Forest Road
Forest Trail
Forest Service Trail location approx
Forest Service Road location approx



18

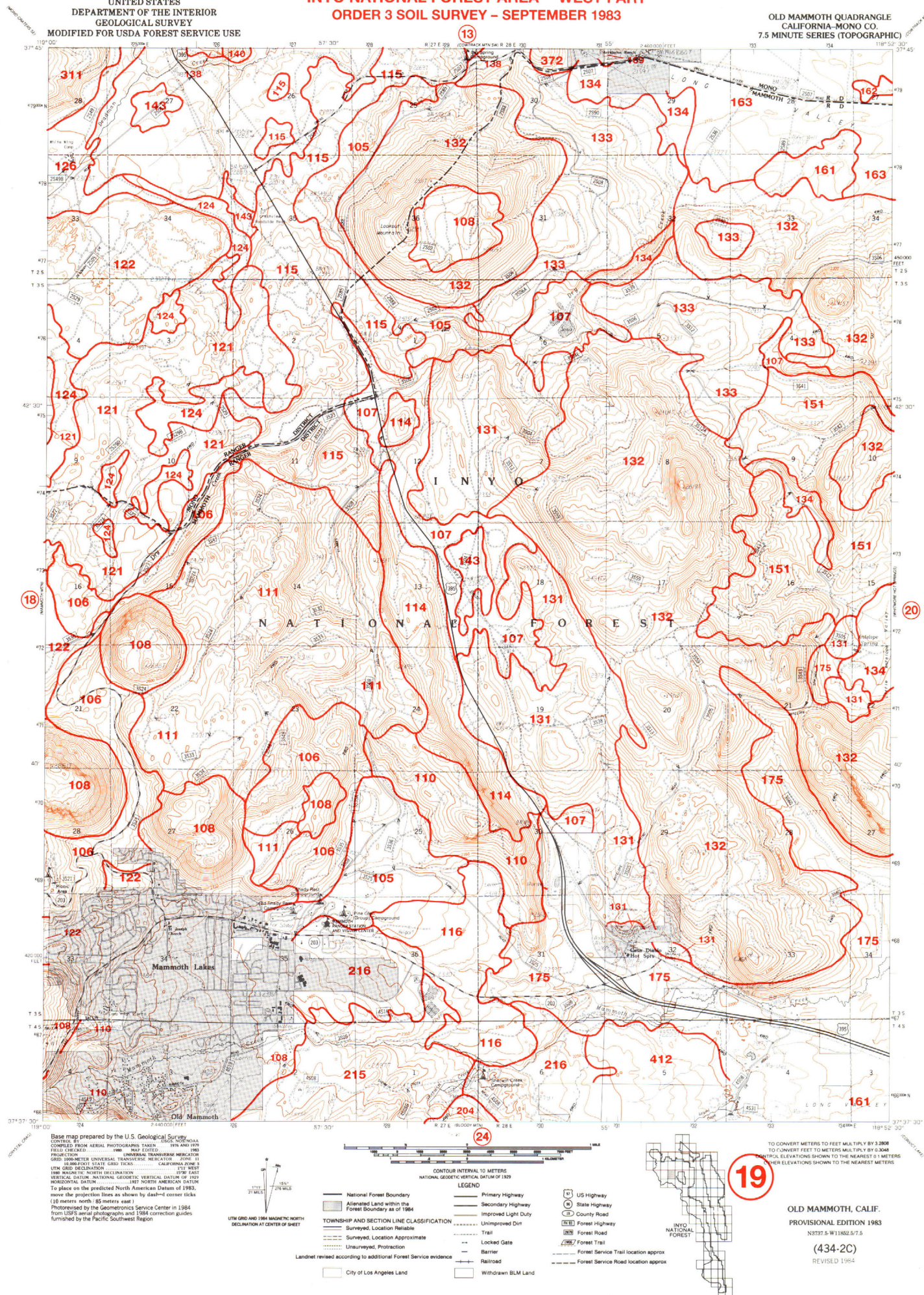
TO CONVERT METERS TO FEET MULTIPLY BY 3.2808
TO CONVERT FEET TO METERS MULTIPLY BY 0.3048
CONTROL ELEVATIONS SHOWN TO THE NEAREST 0.1 METERS
OTHER ELEVATIONS SHOWN TO THE NEAREST METERS

MAMMOTH MTN., CALIF.
PROVISIONAL EDITION 1984

N3757.5.W11900.7.5

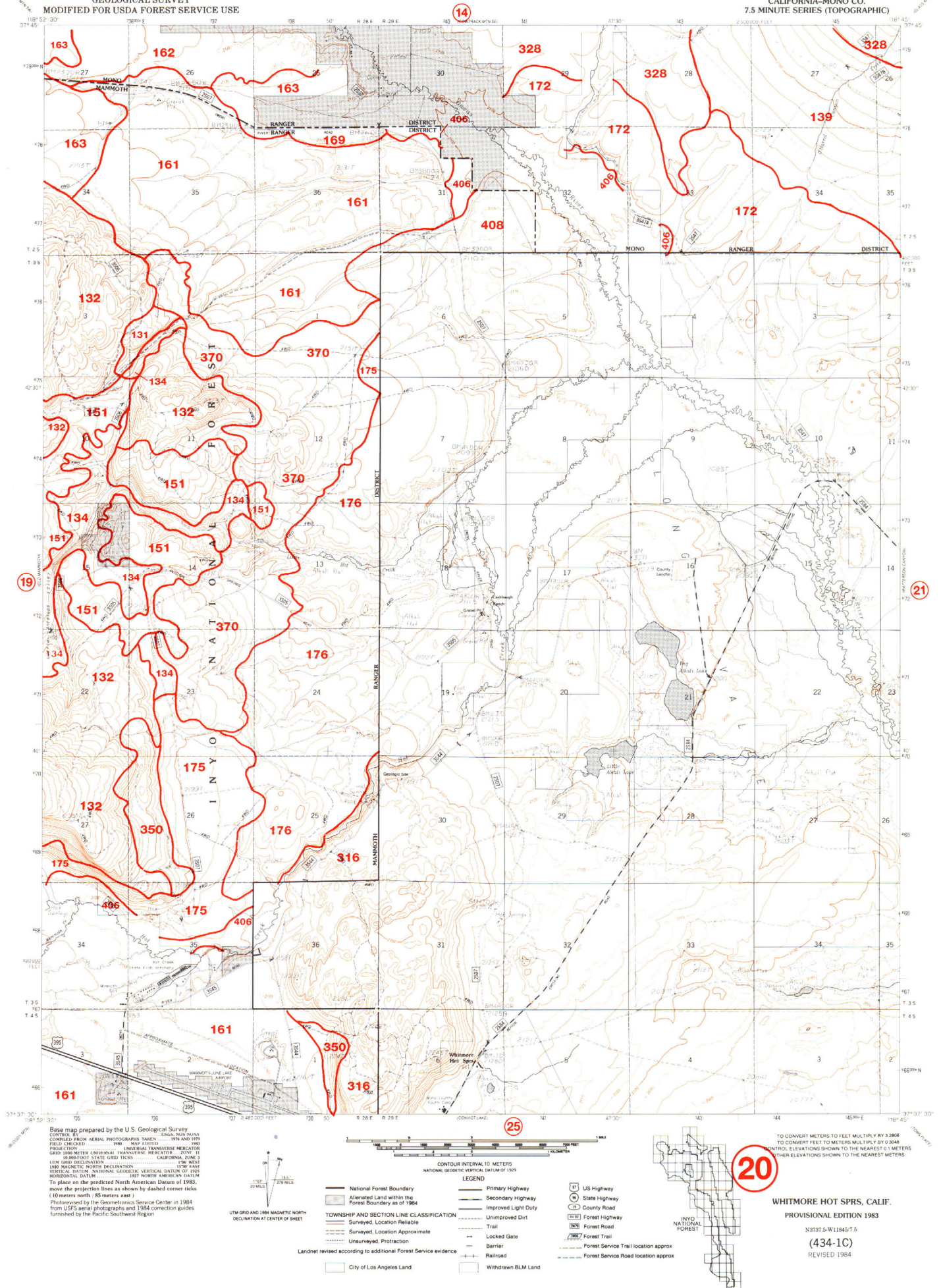
(435-1C)

OLD MAMMOTH QUADRANGLE
CALIFORNIA-MONO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



WHITMORE HOT SPRS QUADRANGLE
CALIFORNIA-MONO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

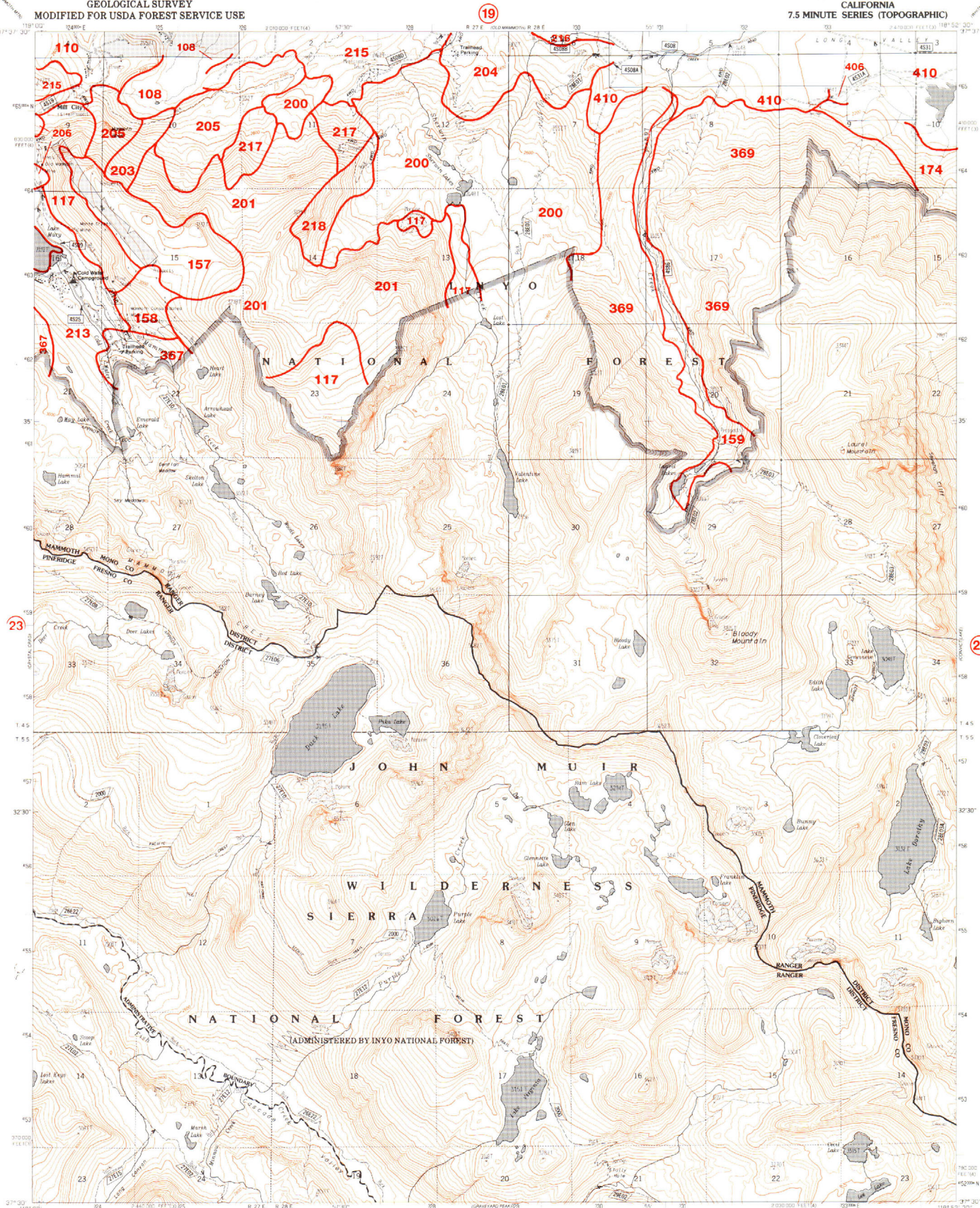
WHITMORE HOT SPRS QUADRANGLE
CALIFORNIA-MONO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



INYO NATIONAL FOREST AREA - WEST PART ORDER 3 SOIL SURVEY - SEPTEMBER 1983

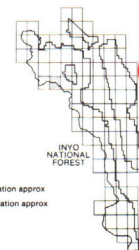
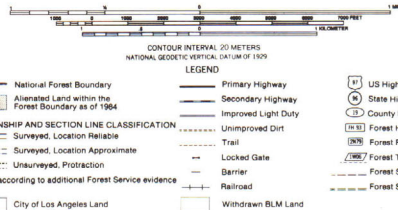
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

BLOODY MTN. QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)



Base map prepared by the U.S. Geological Survey
CONTROL FROM AERIAL PHOTOGRAPHS TAKEN 1948-1950
FIELD CHECKED 1960 MAP EDITED 1960
PROJECTION 1960 METERS UNIVERSAL TRANSVERSE MERCATOR ZONE 11
15,000-FOOT STATE GRID TICS - CALIFORNIA ZONE 12 AND 4
UTM GRID 100-METER INTERVAL
1960 MAGNETIC NORTH DECLINATION 11.1 WEST
1983 MAGNETIC NORTH DECLINATION 11.1 WEST
1983 NORTH AMERICAN DATUM
To place on the predicted North American Datum of 1983,
move the projection lines as shown by dashed corner ticks
10 meters north 85 meters east
Photorevised by the Geomatics Service Center in 1984
from USGS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region

UTM GRID AND 1983 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



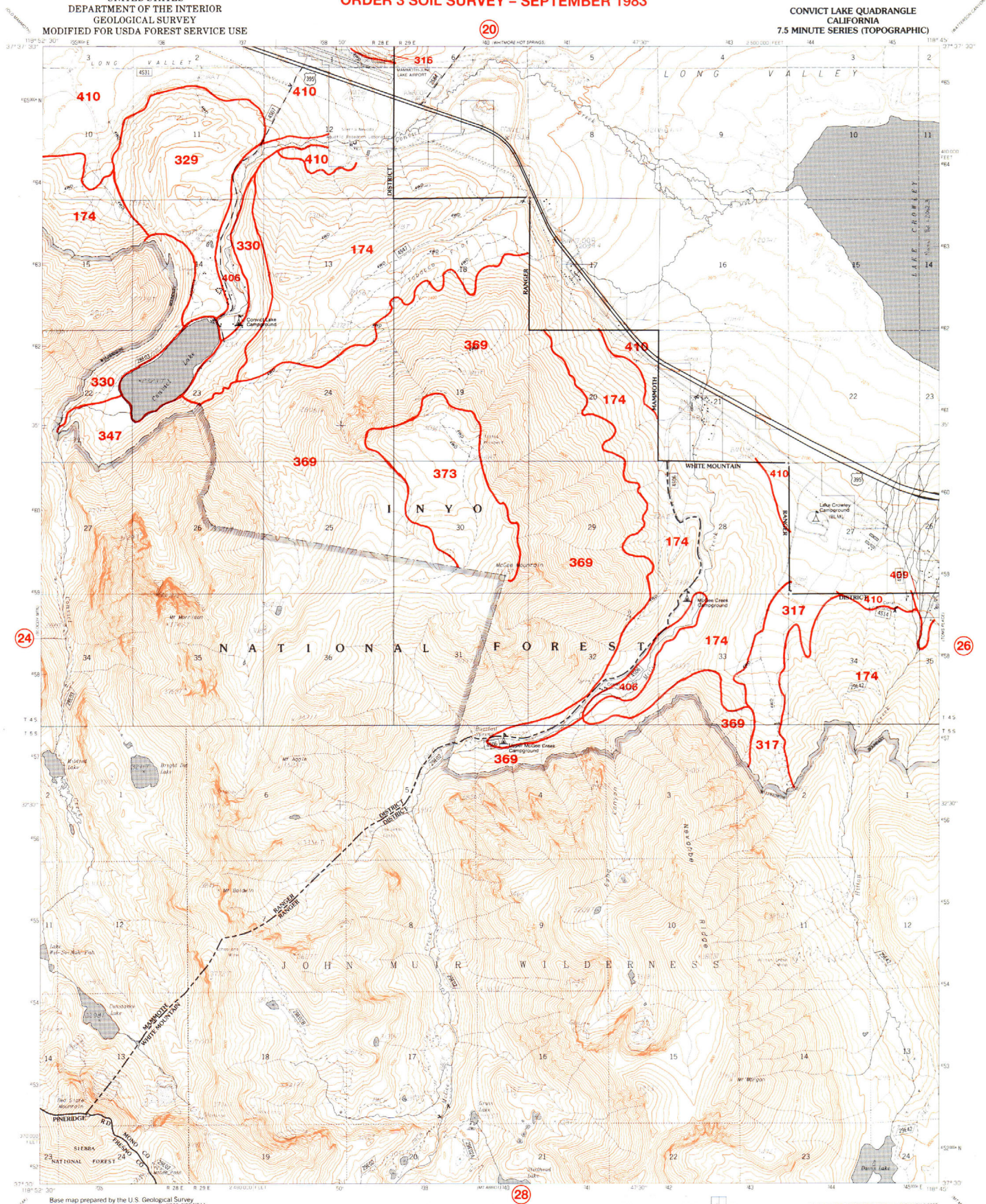
24

TO CONVERT METERS TO FEET MULTIPLY BY 3.2808
TO CONVERT FEET TO METERS MULTIPLY BY 0.3048
CONTROL ELEVATIONS SHOWN TO THE NEAREST 0.1 METERS
OTHER ELEVATIONS SHOWN TO THE NEAREST METERS

BLOODY MTN. CALIF.
PROVISIONAL EDITION 1983
N3736 W11852 5/7.5
(434-3C)
REVISED 1984

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

CONVICT LAKE QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)



Base map prepared by the U.S. Geological Survey. U.S. GEOLOGICAL SURVEY
CONTROLS: 1983 AIR PHOTOGRAPHIC SURVEY. U.S. GEOLOGICAL SURVEY
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN IN 1978 AND 1979
FIELD PHOTOGRAPHED IN 1983
PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
GRID: 1000 METERS UNIVERSAL TRANSVERSE MERCATOR ZONE 11
UTM GRID
UTM GRID DECLINATION: 1983
UTM GRID DECLINATION: 1983
VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM OF 1929
VERTICAL DATUM: 1983
To place on the predicted North American Datum of 1983,
move the projection lines as shown by dashed contour lines
(10 meters north = 85 meters east)
Photorevised by the Geomatics Service Center in 1984
from the U.S. aerial photograph of 1983. 1984 correction grids
furnished by the Pacific Southwest Region

UTM GRID AND 1984 MAGNETIC NORTH

0 100 200 Miles

CONTOUR
NATIONAL GEODESIC


— National Forest Boundary
 Alienated Land within the
 Forest Boundary as of 1984

TOWNSHIP AND SECTION LINE CLASSIFICATION

— Surveyed, Location Reliable
 - - - Surveyed, Location Approximate
 Unserved, Protraction

City of Los Angeles Land

revised according to additional Forest Service evidence



- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Locked Gate
- Barrier
- Railroad
- Withdrawn BLM Land

TO CONVERT METERS TO FEET MULTIPLY BY 3.2808
TO CONVERT FEET TO METERS MULTIPLY BY 0.3048
CONTROL ELEVATIONS SHOWN TO THE NEAREST 0.1 METER
OTHER ELEVATIONS SHOWN TO THE NEAREST METER

25

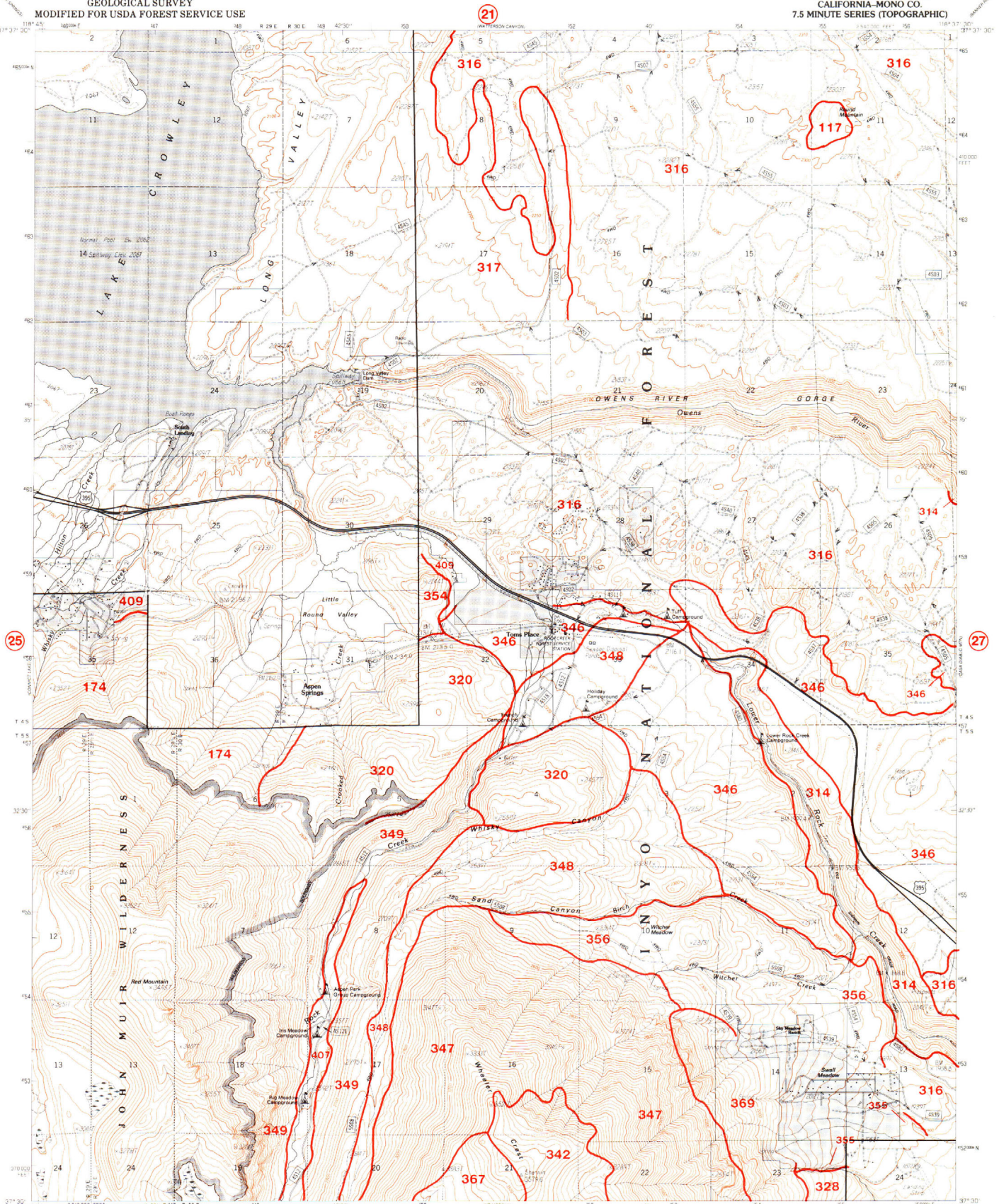
CONVICT LAKE, CALIF.
PROVISIONAL EDITION 1983

N8730-W11845/7.5
(434-4C)
REVISED 1984

INYO NATIONAL FOREST AREA - WEST PART ORDER 3 SOIL SURVEY - SEPTEMBER 1983

TOMS PLACE QUADRANGLE
CALIFORNIA-MONO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE



Base map prepared by the U.S. Geological Survey
CONTROL BY: INDO, MINNEAPOLIS
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN: 1979-7, 1978
FIELD CHECKED: 1980, 1981
PROJECTION: TRANSVERSE MERCATOR, ZONE 11
GRID: 1000 METER UNIVERSAL TRANSVERSE MERCATOR, ZONE 11
DATUM: 1983 NORTH AMERICAN DATUM
MAGNETIC NORTH DECLINATION: 1983 WEST
UTM GRID DECLINATION: 1983 WEST
VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM OF 1929
HORIZONTAL DATUM: 1983 NORTH AMERICAN DATUM
To place on the predicted North American Datum of 1983,
move the projection lines as shown by dashed corner ticks
(10 meters north 84 meters east)
Photorevised by the Geomatics Service Center in 1984
from 1:25,000 aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region



- LEGEND**
- National Forest Boundary
 - Alienated Land within the Forest Boundary as of 1964
 - Primary Highway
 - Secondary Highway
 - Improved Light Duty
 - Unimproved Dirt
 - Trail
 - Locked Gate
 - Barrier
 - Railroad
 - Withdrawn BLM Land
 - City of Los Angeles Land
 - US Highway
 - State Highway
 - County Road
 - Forest Highway
 - Forest Road
 - Forest Trail
 - Forest Service Trail location approx
 - Forest Service Road location approx

26

TOMS PLACE, CALIF.
PROVISIONAL EDITION 1984
N3736-W11837-5/7.5
(433-3C)

CASA DIABLO MTN. QUADRANGLE
CALIFORNIA-MONO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

[illegible]

TO CONVERT METERS TO FEET MULTIPLY BY 3.2808
TO CONVERT FEET TO METERS MULTIPLY BY 0.3048
CONTROL ELEVATIONS SHOWN TO THE NEAREST 0.1 METERS
OTHER ELEVATIONS SHOWN TO THE NEAREST METERS

27

CASA DIABLO MTN., CALIF.
PROVISIONAL EDITION 1984

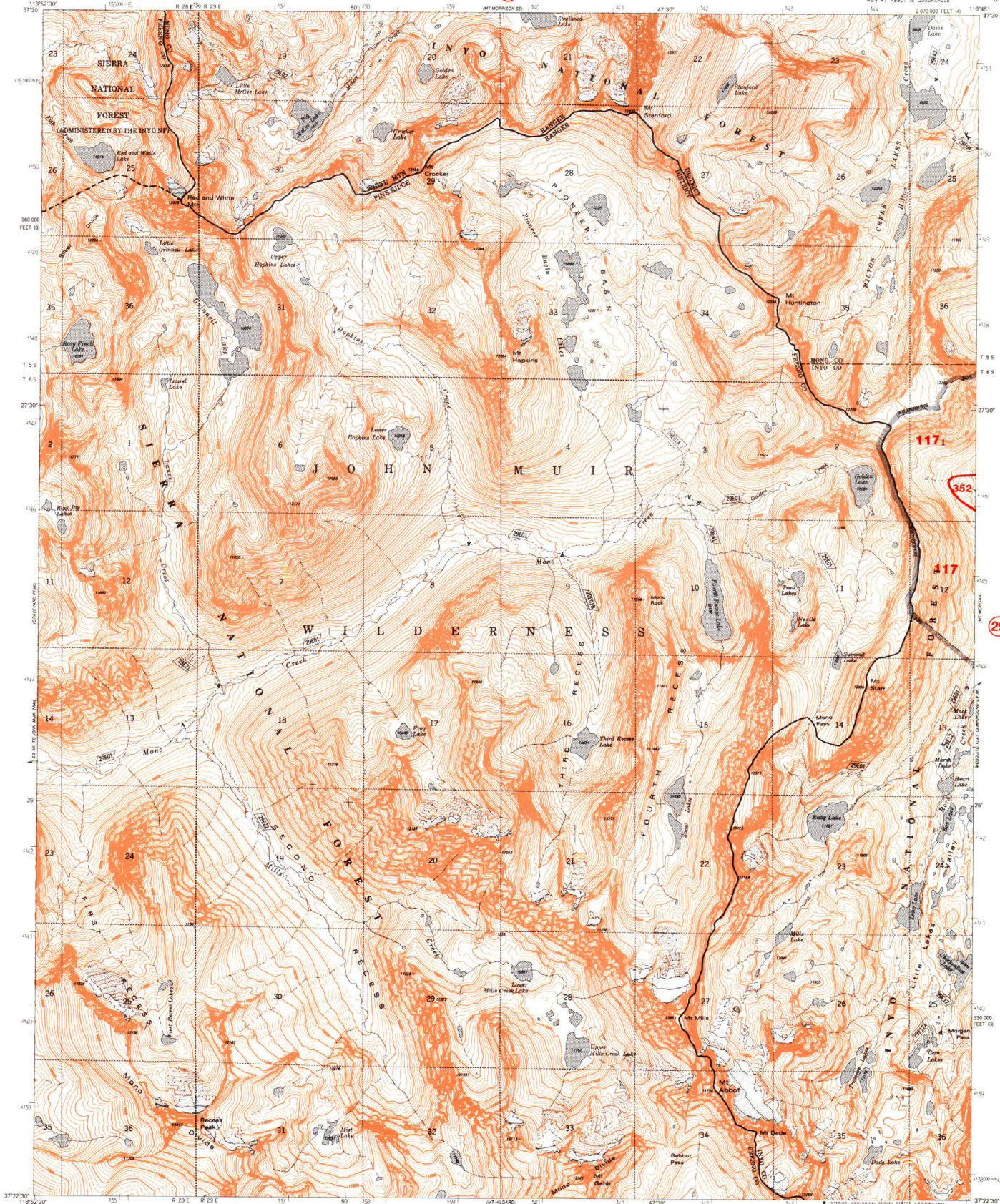
N2730-W11890/7.5
(433-4C)

N3730-W11830/7.5
(433-4C)

INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

MT. ABBOT QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
NE 4 MT. ABBOT 19 QUADRANGLE



Base map prepared by the U.S. Geological Survey
Control by USGS and NOS/NOAA
Topography by photogrammetric methods from aerial
photographs taken 1976. Field checked 1978. Map edited 1982
Projection: California coordinate system, zone 4
(Lambert conformal conic)
10,000-foot grid ticks based on California coordinate
system, zone 4 and 3
1000-meter Universal Transverse Mercator grid, zone 11
1927 North American Datum
To place on the predicted North American Datum (1983)
move the projection lines 10 meters north and
85 meters east as shown by dashed corner ticks
Photorevised by the Geomatrix Service Center in 1984 from
USFS 1982 1:12,000 and 1:24,000 aerial photographs and 1984
correction guides furnished by the Pacific Southwest Region.



CONTOUR INTERVAL ADJUSTED
NATIONAL GEODETIC VERTICAL DATUM OF 1929

LEGEND

National Forest Boundary
Alienated Land within the Forest Boundary as of 1984

TOWNSHIP AND SECTION LINE CLASSIFICATION

Surveyed, Location Reliable
Surveyed, Location Approximate
Unsurveyed, Protection

Landnet revised according to additional Forest Service evidence

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Locked Gate
Barrier
Railroad

US Highway
State Highway
County Road
Forest Highway
Forest Road
Forest Trail
Forest Service Trail location approx
Forest Service Road location approx



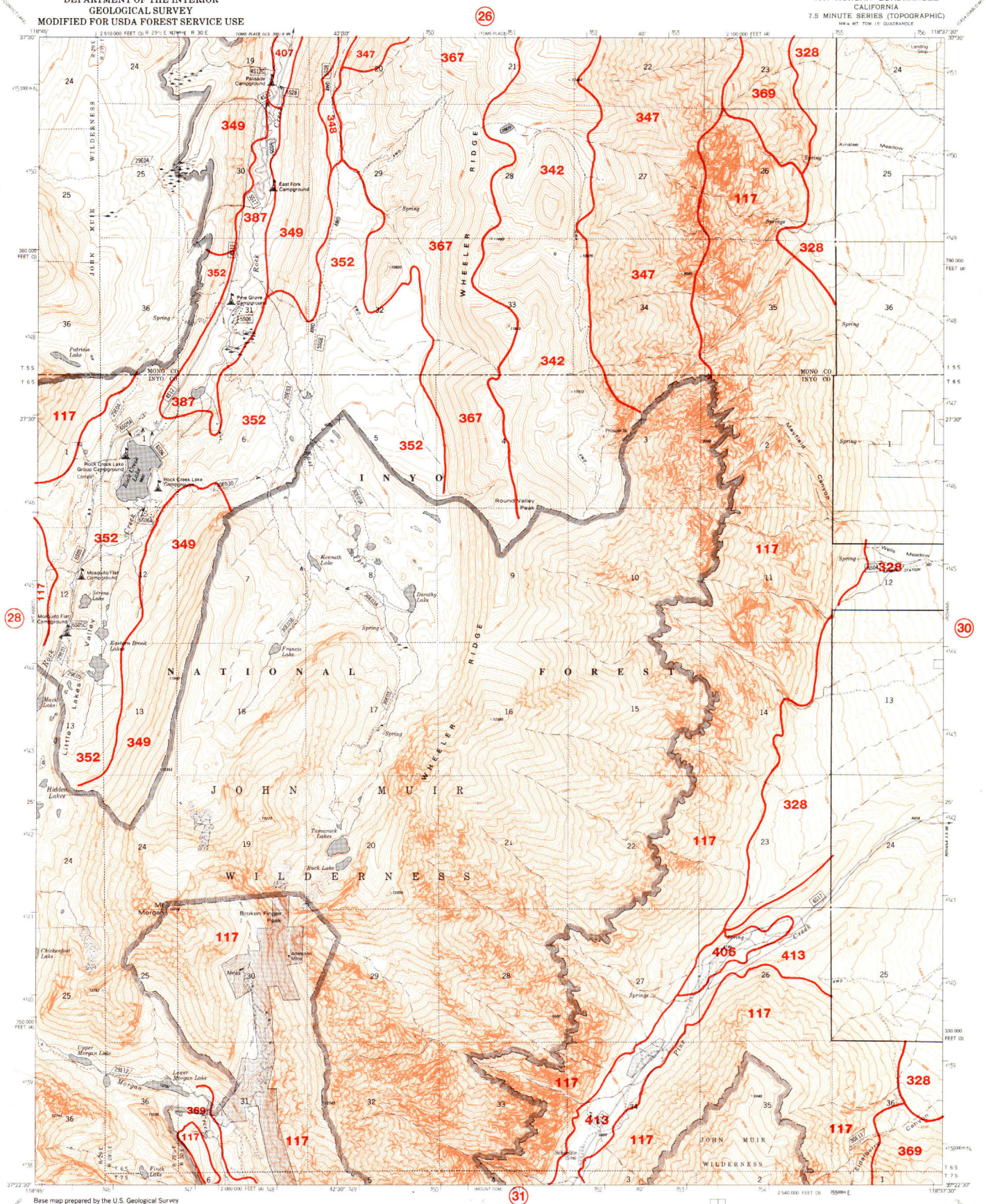
28

MT. ABBOT, CALIF.
NE 4 MT. ABBOT 19 QUADRANGLE
N3722.5-W11845.7 5
1982
DMA 2258 (V NE-SERIES) 1985
(415-1C)
REVISED 1984

INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

MT. MORGAN QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
NADA MT. TOW. 17 QUADRANGLE



Base map prepared by the U.S. Geological Survey

Control by USGS and NAD 83/2011
Topography by photogrammetric methods from aerial photographs
taken 1976. Field checked 1978. Map edited 1982
Projection: California coordinate system, zone 4
10,000-foot grid ticks based on California coordinate system,
zones 4 and 3
1983 North American Datum
To place on the predicted North American Datum 1983
move the projection lines 10 meters north and
84 meters west as shown by dashed corner ticks
Photorevised by the Geomatics Service Center in 1984
from USGS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region
Landmark revised according to additional Forest Service evidence

UTM GRID and 1984 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 40 FEET
NATIONAL GEOGRAPHIC VERTICAL DATUM OF 1929

LEGEND

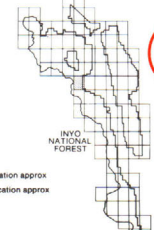
TOWNSHIP AND SECTION LINE CLASSIFICATION

City of Los Angeles Land

Withdrawn BLM Land

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Light
Trail
Locked Gate
Barrier
Railroad

US Highway
State Highway
County Road
Forest Highway
Forest Road
Forest Trail
Forest Service Trail location approx
Forest Service Road location approx



29

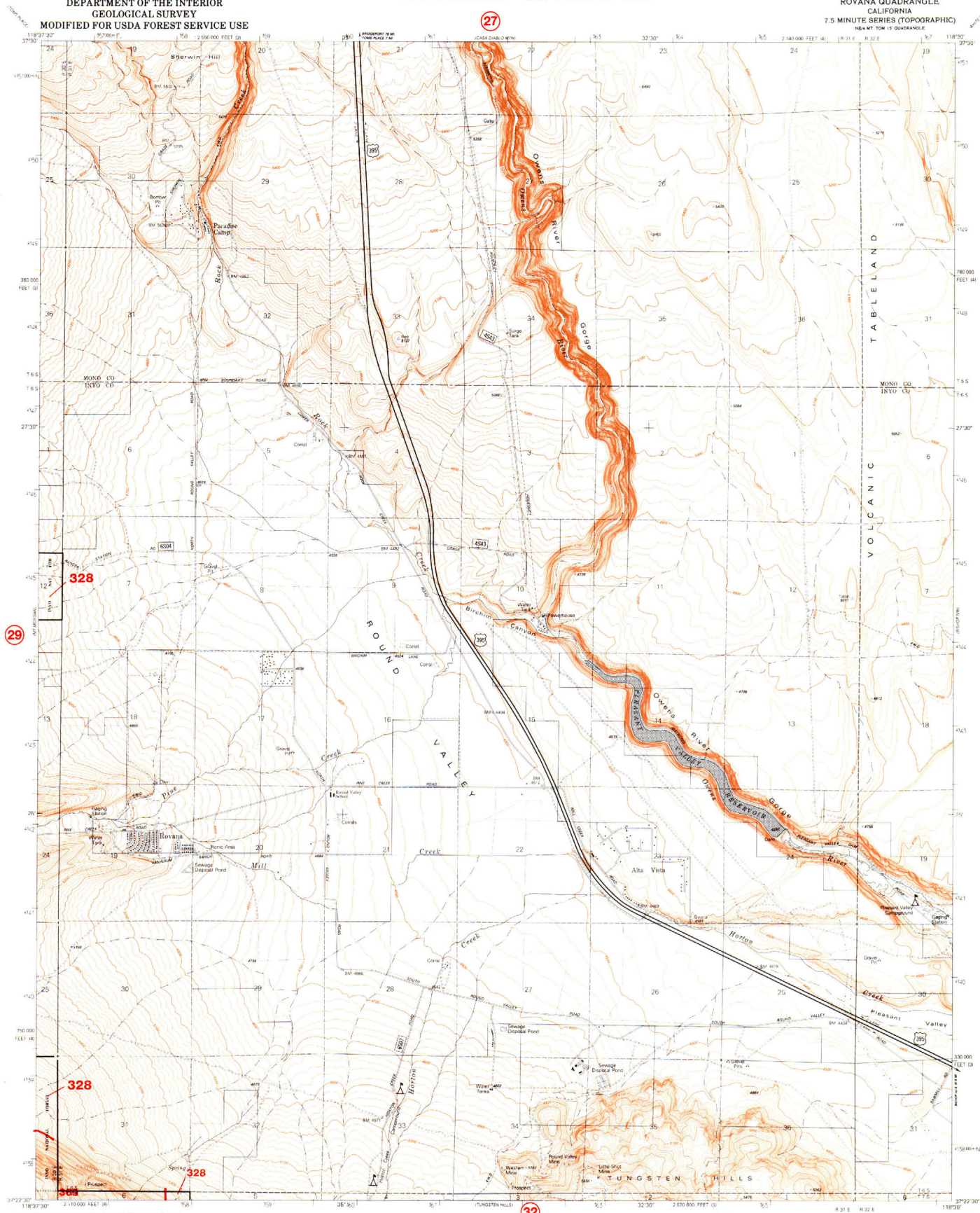
MT. MORGAN, CALIF.
NADA MT. TOW. 17 QUADRANGLE
NAD 83 5-W1867 5/7 S
1982
REVISED 1984
(414-2C)

INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

ROVANA QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
NE 4 MT. TOW. 15 QUADRANGLE

27



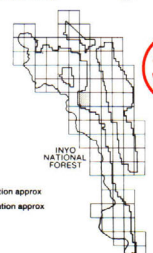
Base map prepared by the U.S. Geological Survey
Control by USGS and NOS/NOAA
Topography by photogrammetric methods from aerial
photographs taken 1976. Field checked 1978. Map edited 1983
Projection: California coordinate system, zone 4
(Lambert conformal conic)
10,000 foot grid ticks based on California coordinate
system, zone 4 and 5
1000-meter Universal Transverse Mercator grid, zone 11
1927 North American
To place on the predicted North American Datum 1983
move the projection lines 10 meters north and
84 meters east as shown by dashed corner ticks
Photorevised by the Geomorphics Service Center in 1984
from USGS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region

UTM GRID AND 1984 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



- LEGEND**
- National Forest Boundary
 - Alienated Land within the Forest Boundary as of 1984
 - TOWNSHIP AND SECTION LINE CLASSIFICATION
 - Surveyed, Location Reliable
 - Surveyed, Location Approximate
 - Unsurveyed, Protection
 - Landnet revised according to additional Forest Service evidence
 - City of Los Angeles Land
 - Primary Highway
 - Secondary Highway
 - Improved Light Duty
 - Unimproved Dirt
 - Trail
 - Locked Gate
 - Barrier
 - Railroad
 - Withdrawn BLM Land

- US Highway
- State Highway
- County Road
- Forest Highway
- Forest Road
- Forest Trail
- Forest Service Trail location approx
- Forest Service Road location approx



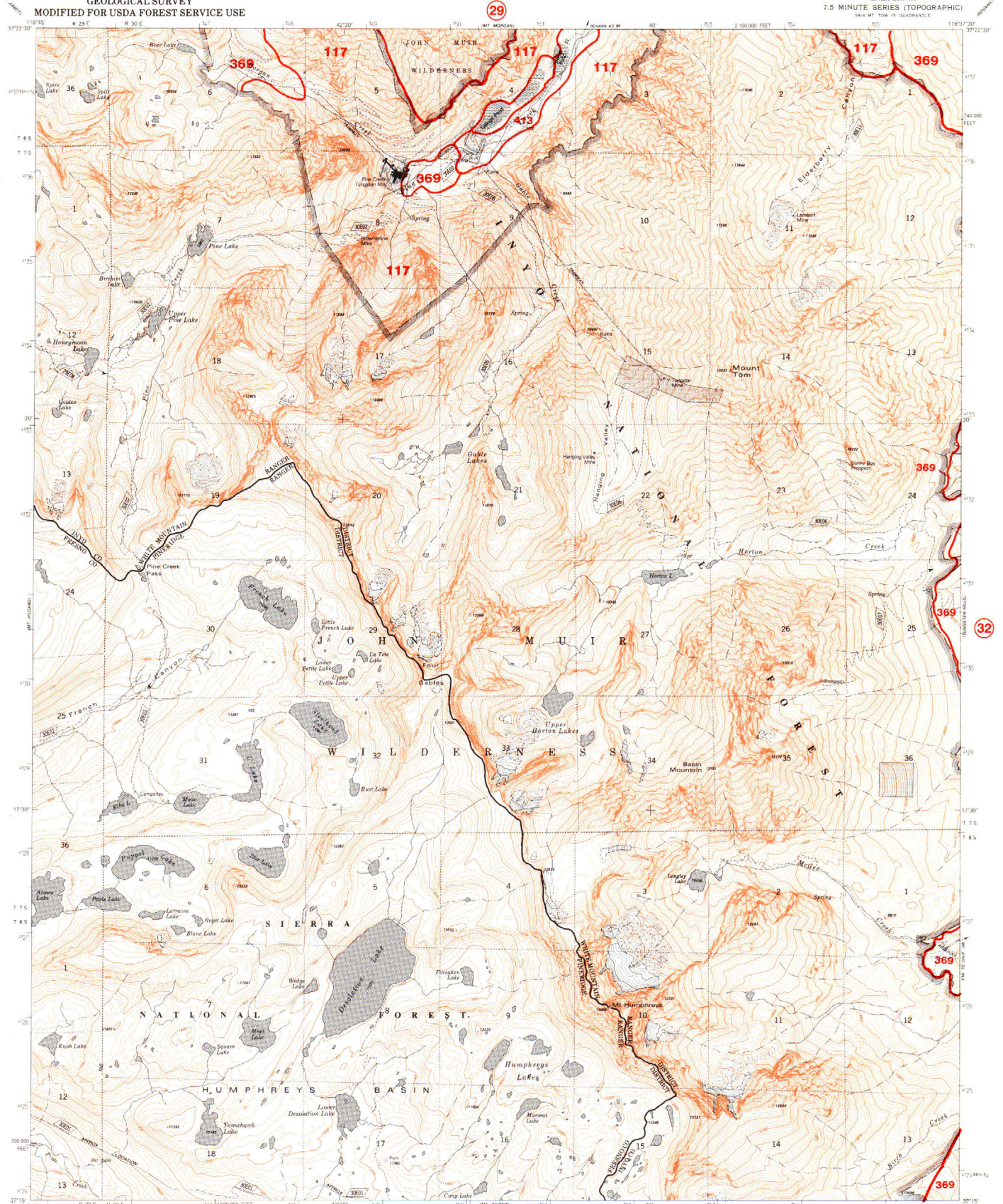
30

ROVANA, CALIF.
NE 4 MT. TOW. 15 QUADRANGLE
N3722 S - W11807 E
1983
REVISED 1984
(414-1C)

INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

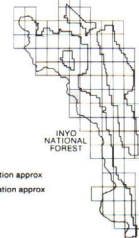
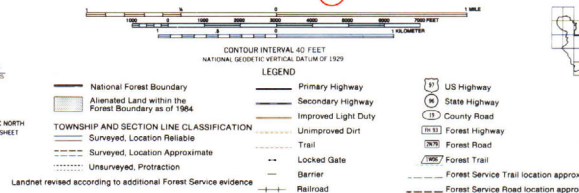
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

MOUNT TOM QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW 4 MT. TOM 15 QUADRANGLE



Base map prepared by the U.S. Geological Survey

Control by USGS and NOAA
Topography by photogrammetric methods from aerial
photographs taken 1976. Fields checked 1978. Map edited 1982
Projection and 10,000-foot grid ticks: California coordinate
system, zone 4 Lambert conformal conic
1000-meter Universal Transverse Mercator grid, zone 11
1983 North American Datum
To place on the predicted North American Datum 1983
move the projection lines 10 meters north and
94 meters east as shown by dashed corner ticks
Photorevised by the Geomatics Service Center in 1984
from USGS aerial photographs and 1984 correction guides
turned by the Pacific Southwest Region



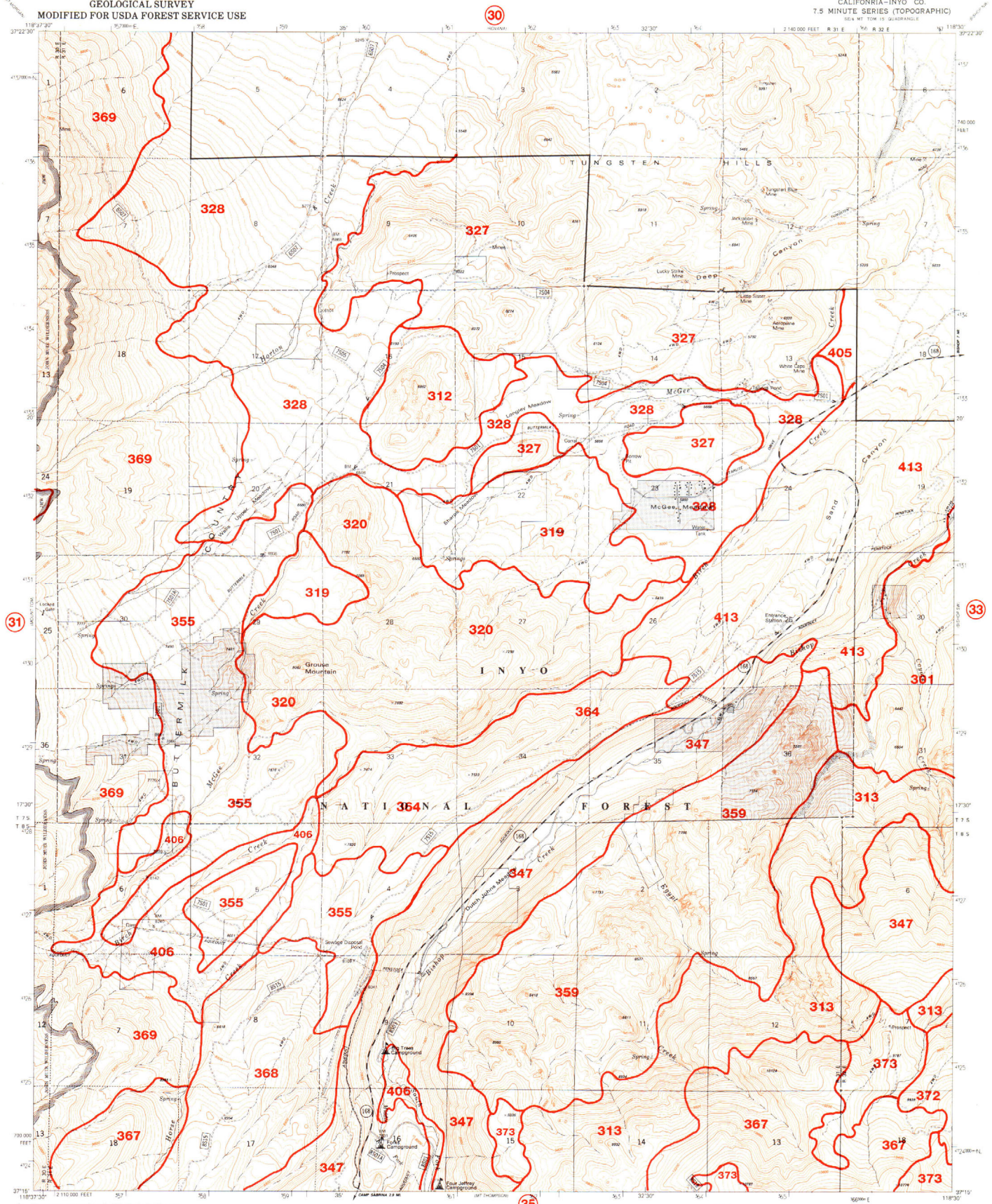
31

MOUNT TOM, CALIF.
SW 4 MT. TOM 15 QUADRANGLE
N3715-W11837-501-5
1982
REVISED 1984
(414-3C)

INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

TUNGSTEN HILLS QUADRANGLE
CALIFORNIA-INYO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
SECTION 15 QUADRANGLE

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE



Base map prepared by the U.S. Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1976. Field checked 1976. Map edited 1980

Projection and 10,000-foot grid ticks. California coordinate system, zone 4 (Lambert conformal conic)

100-meter Universal Transverse Mercator grid, zone 11 1983 North American Datum

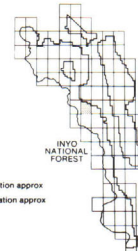
To place on the predicted North American Datum 1983 move the projection lines 30 meters north and 84 meters east as shown by dashed corner ticks

Photorevised by the Geomatics Service Center in 1984 from USGS aerial photographs and 1984 correction guides furnished by the Pacific Southwest Region

UTM GRID AND 1984 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

- LEGEND
- National Forest Boundary
 - Assigned Land within the Forest Boundary as of 1984
 - Township and Section Line Classification
 - Surveyed, Location Reliable
 - Surveyed, Location Approximate
 - Unsurveyed, Protraction
 - Landnet revised according to additional Forest Service evidence
 - City of Los Angeles Land
 - Primary Highway
 - Secondary Highway
 - Improved Light Duty
 - Unimproved Dirt
 - Trail
 - Locked Gate
 - Barrier
 - Railroad
 - Withdrawn BLM Land
 - US Highway
 - State Highway
 - County Road
 - Forest Highway
 - Forest Road
 - Forest Trail
 - Forest Service Trail location approx
 - Forest Service Road location approx



32

TUNGSTEN HILLS, CALIF.

SECTION 15 QUADRANGLE

7.5 MINUTE SERIES (TOPOGRAPHIC)

1982

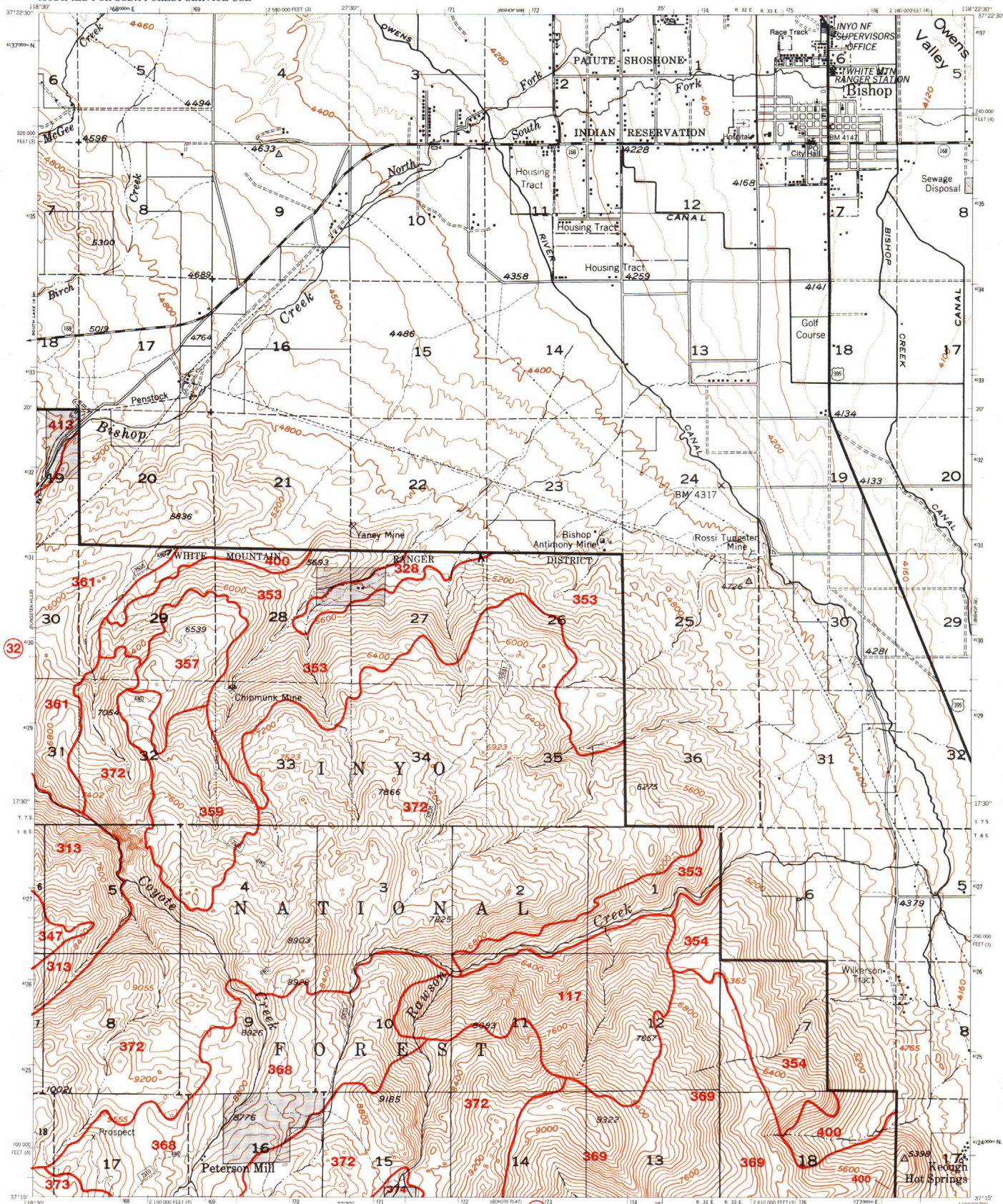
REVISED 1984

(414-4C)

INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

BISHOP SW QUADRANGLE
MT DIABLO MERIDIAN
INYO CO. CALIFORNIA
7.5 MINUTE SERIES

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

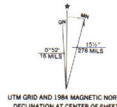


Base map prepared by the U.S. Geological Survey
Topography by photogrammetric methods from aerial photographs
Map dated 1962

Projection: 1927 North American datum 3 and 4
10,000-foot grid based on California coordinate system zone
1000-metre Universal Transverse Mercator grid ticks zone 11

INTERIM EDITION

Photorevised by the Geomatics Service Center in 1984
from USGS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region



Legend

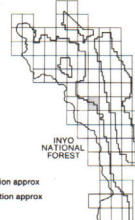
- National Forest Boundary
- Altered Land within the Forest Boundary as of 1984
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Approximate
- Unsurveyed, Protection
- Landmark revised according to additional Forest Service evidence
- City of Los Angeles Land
- Withdrawn BLM Land

Legend

- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Locked Gate
- Barrier
- Railroad
- Withdrawn BLM Land

Legend

- US Highway
- State Highway
- County Road
- Forest Highway
- Forest Road
- Forest Trail
- Forest Service Trail location approx
- Forest Service Road location approx



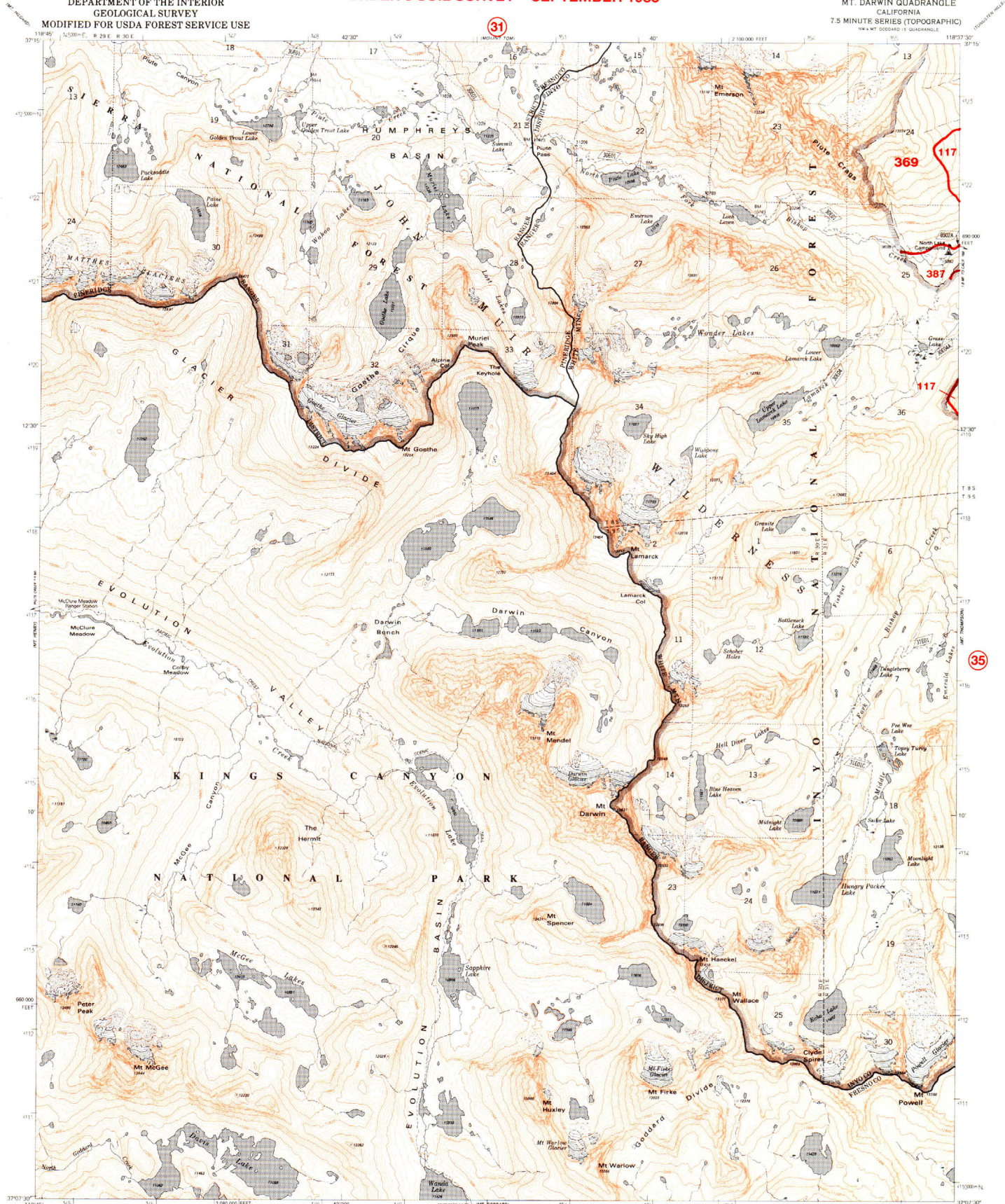
33

BISHOP SW, CALIFORNIA
N3715-W11822.5
(413-3C)
REVISED 1984

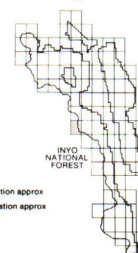
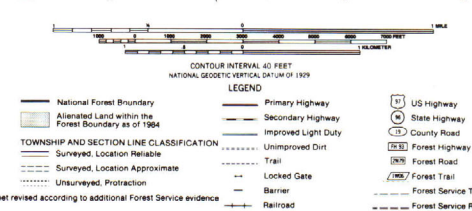
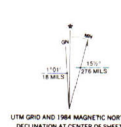
INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

MT. DARWIN QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
U.S. MT. DARWIN 1:50,000



Base map prepared by the U.S. Geological Survey
Control by USGS and NOS/NOAA
Topography by photogrammetric methods from aerial
photographs taken 1976. Field checked 1978. Map edited 1983
Projection and 10,000 foot grid ticks: California coordinate
system, zone 4 (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid, zone 11
1927 North American Datum
To place on the predicted North American Datum 1983
move the projection lines 10 meters north and
84 meters east as shown by dashed corner ticks
Photorevised by the Geomatics Service Center in 1984
from 1955 aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region

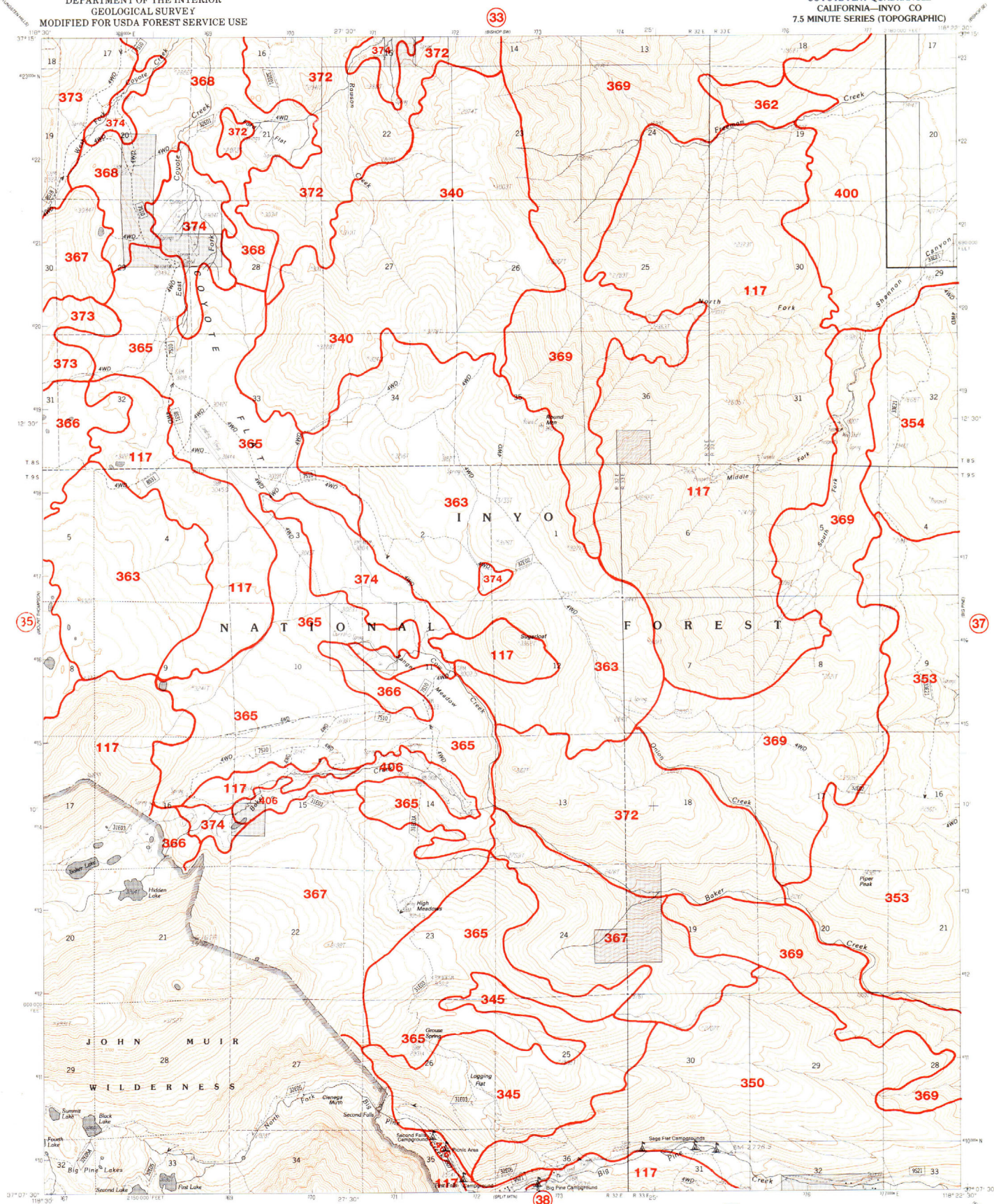


34

MT. DARWIN, CALIF.
U.S. MT. DARWIN 1:50,000
1983
(394-2C)
REVISED 1984

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

COYOTE FLAT QUADRANGLE
CALIFORNIA—INYO CO
7.5 MINUTE SERIES (TOPOGRAPHIC)









Base map prepared by the U.S. Geological Survey
CONTROL BY U.S.G.S., WASHINGTON, CITY OF LOS ANGELES
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN 1959
FIELD NUMBER 1000
PROJECTION UNIVERSAL TRANSVERSE MERCATOR
GRID 1000-METER UNIVERSAL TRANSVERSE MERCATOR 20N
10,000-FOOT STATE GRID TICS CALIFORNIA, ZONE
UTM GRID DECLINATION 1927
MAGNETIC NORTH DECLINATION 1959
VERTICAL DATUM NATIONAL GEODESIC VERTICAL DATUM OF
HORIZONTAL DATUM 1927 NORTH AMERICAN DATUM
To place on the predicted North American Datum of 1983, the
move the projection lines as shown by dashed corner
(10 meters north / 84 meters east)
Photorevised by the Geomatics Service Center in 1984
from USFS aerial photographs and 1984 correction guide
furnished by the Pacific Southwest Region

UTM GRID AND 1984 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

☐ City of Los Angeles Land

LEGEND

- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Locked Gate
- Barrier
- Railroad
- Withdrawn BLM Land

 US Highway
 State Highway
 County Road
 Forest Highway
 Forest Road
 Forest Trail
 Forest Service Trail location approx
 Forest Service Road location approx

COYOTE FLAT, CALIF.
PROVISIONAL EDITION 1984

N3707.5-W11822.5/7
(393-2C)

36

BIG PINE QUADRANGLE
CALIFORNIA-INYO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This is a detailed topographic map of the Big Pine area within the Inyo National Forest. The map features a grid system with section numbers (e.g., 17, 16, 15, 14, 13, 18, 17, 16 in the top row) and township/range coordinates. Key geographical features include Inyo Lake, Big Pine Creek, and Warren Bench. Several land parcels are highlighted with red outlines and labeled with numbers: 354, 400, 351, 353, 350, 352, 369, and 355. The map also shows roads, including Highway 168, and various landmarks such as the Owens Valley Radio Observatory and the Big Pine Cemetery. The map is titled 'MODIFIED FOR USDA FOREST SERVICE USE' and '7.5 MINUTE SERIES (TOPOGRAPHIC)'.

UTM GRID AND 1984 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

[illegible]

TO CONVERT METERS TO FEET MULTIPLY BY 3.2808
TO CONVERT FEET TO METERS MULTIPLY BY 0.3048
CONTROL ELEVATIONS SHOWN TO THE NEAREST 0.1 METERS
CONTROL ELEVATIONS SHOWN TO THE NEAREST METERS

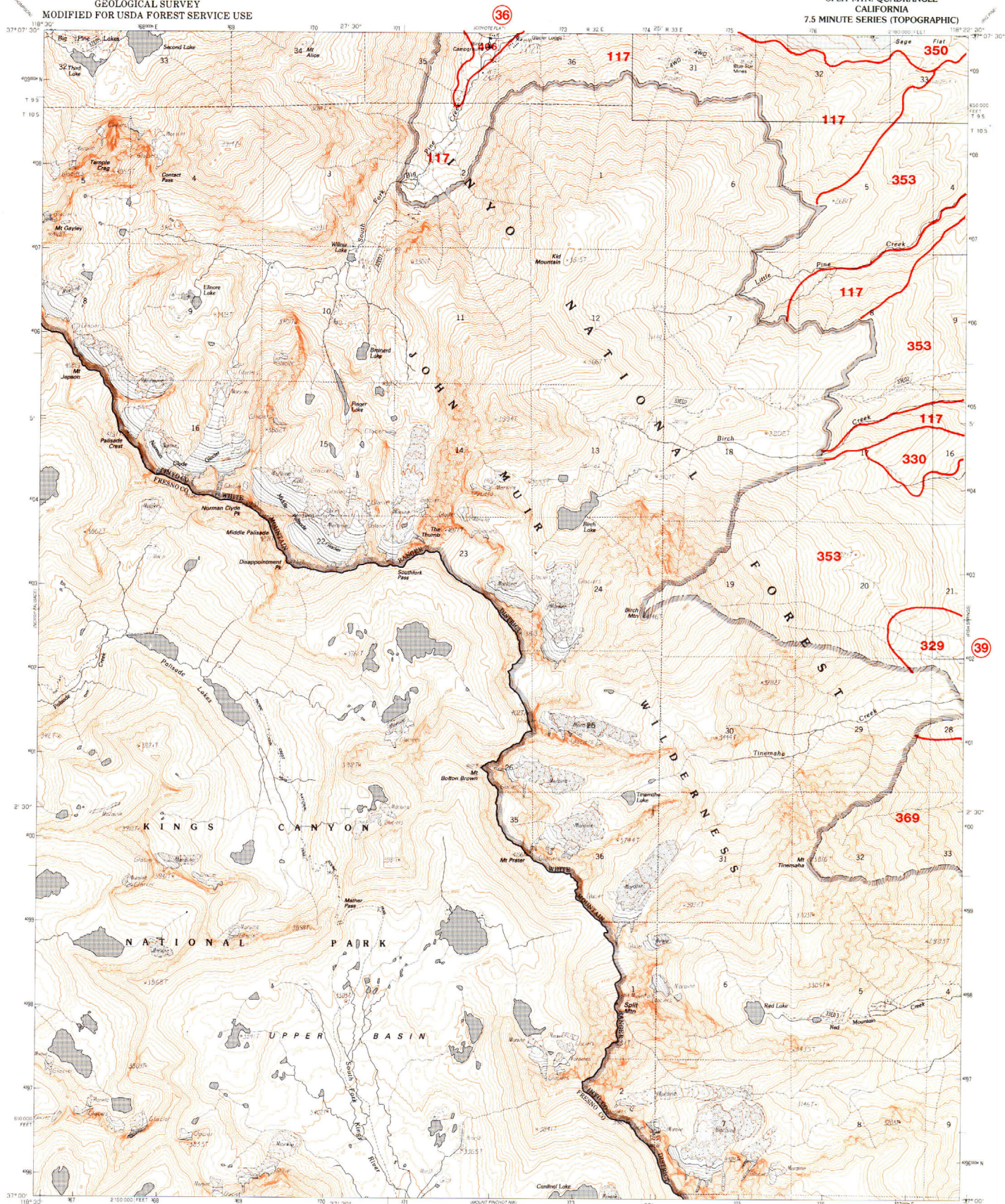
37

BIG PINE, CALIF.
PROVISIONAL EDITION 1984

N3707.5-W11815.75
(393-1C)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

SPLIT MTN. QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)



Base map prepared by the U.S. Geological Survey

CONTROL BY: USFWS, NPS-NDAA
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN 1975, 1979
FIELD CHECKED 1980 MAP EDITED 1984
GRID: UNIVERSAL TRANSVERSE MERCATOR
COORDINATE: 100,000-FOOT STATE GRID TICS CALIFORNIA, ZONE 4
UTM GRID DECLINATION 0152° WEST
MAGNETIC NORTH DECLINATION 1270° EAST
VERTICAL DATUM: NORTH GEODETIC VERTICAL DATUM 1929
HORIZONTAL DATUM 1927 NORTH AMERICAN DATUM
To place on the predicted North American Datum of 1983,
move the projection lines as shown by dashed corner ticks
(.1 meters north .84 meters east)
Photorevised by the Geological Survey in 1984
from USFS aerial photographs and 1984 correction grids
furnished by the Pacific Southwest Region

CONTINUED
NATIONAL GEOGRAPHIC









Legend:

- National Forest Boundary
- Alienated Land within the Forest Boundary as of 1964
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Approximate
- Unsurveyed, Protraction

Landnet revised according to additional Forest Service evidence

LEGEND

- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Locked Gate
- Barrier

 US Highway
 State Highway
 County Road
 Forest Highway
 Forest Road
 Forest Trail
 Forest Service Trail location approx.
 Forest Service Road location approx.

CONT
ON
38

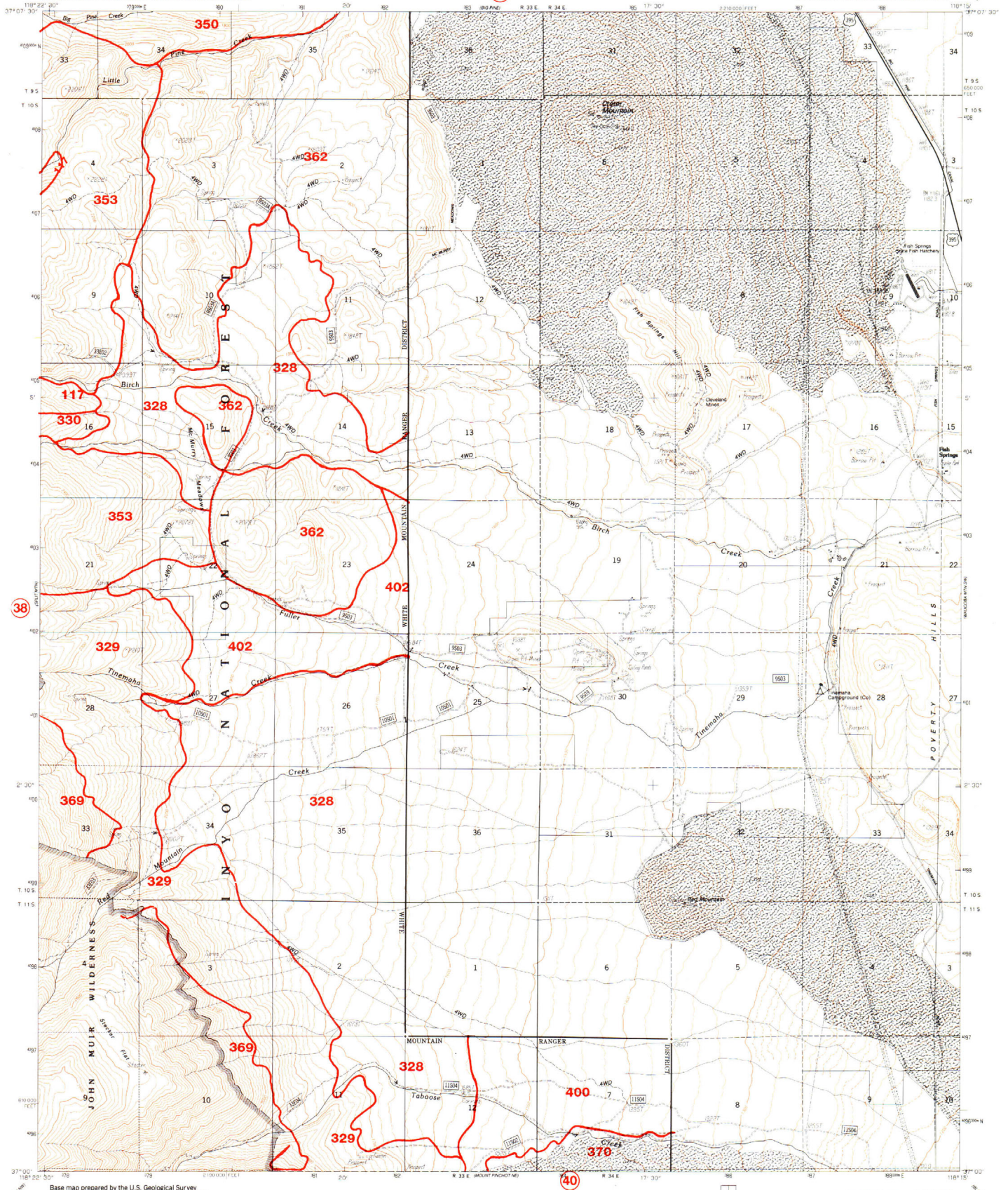
INVERT METERS TO FEET MULTIPLY BY 3.2808
INVERT FEET TO METERS MULTIPLY BY 0.3048
ELEVATIONS SHOWN TO THE NEAREST 0.1 METERS
ELEVATIONS SHOWN TO THE NEAREST METERS

SPLIT MTN., CALIF.
PROVISIONAL EDITION 1984
N3700-W11822.5/7.5
(393-3C)

37

COROTE FLAT 116

WALCOSA M774 R097








Base map prepared by the U.S. Geological Survey
 CONTROL POINTS FROM AERIAL PHOTOGRAPHS TAKEN BY USGS, NOV 1984
 FIELD CHECKED _____ 1990 MAP EDITED _____
 PROJECTION _____ UNIVERSAL TRANSVERSE MERCATOR
 GRID: 100-METER UNIVERSAL TRANSVERSE MERCATOR
 UTM 18N 18N STATE GRID TICS _____ CALIFORNIA
 UTM GRID DECLINATION _____ 0°07'
 1980 MAGNETIC NORTH DECLINATION _____ 13°55'
 VERTICAL DATUM _____ NATIONAL GEODETIC VERTICAL DATUM OF 1985
 PHOTOGRAPHED BY THE U.S. GEOLOGICAL SURVEY, 1984
 To place on the predicted North American Datum of 1983
 move the projection lines as shown by dashed center
 Photorevised by the Geomatics Section Center in 1986
 from USGS aerial photographs and 1984 correction guide
 furnished by the Pacific Southwest Region

UTM GRID AND 1984 MAGNETIC NORTH

UTM GRID NORTH 0° 48' 14 MILS



MAGNETIC NORTH 15° 276 MILS

TRUE NORTH

 National Forest Boundary
 Alienated Land within the Forest Boundary as of 1960
TOWNSHIP AND SECTION LINE CORRELATION
 Surveyed, Location Reliable
 Surveyed, Location Approximate
 Unsurveyed, Protraction
 revised according to additional Forest Survey
 City of Los Angeles Land

LEGEND

- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Locked Gate
- Barrier
- Railroad
- Withdrawn BLM Land

 US Highway
 State Highway
 County Road
 Forest Highway
 Forest Road
 Forest Trail
 Forest Service Trail location approx.
 Forest Service Road location approx.

TO CONVERT METERS TO FEET MULTIPLY BY 3.2808
TO CONVERT FEET TO METERS MULTIPLY BY 0.3048
ELEVATIONS SHOWN TO THE NEAREST 0.1 METERS
ELEVATIONS SHOWN TO THE NEAREST METERS

FISH SPRINGS, CALIF.
PROVISIONAL EDITION 1984

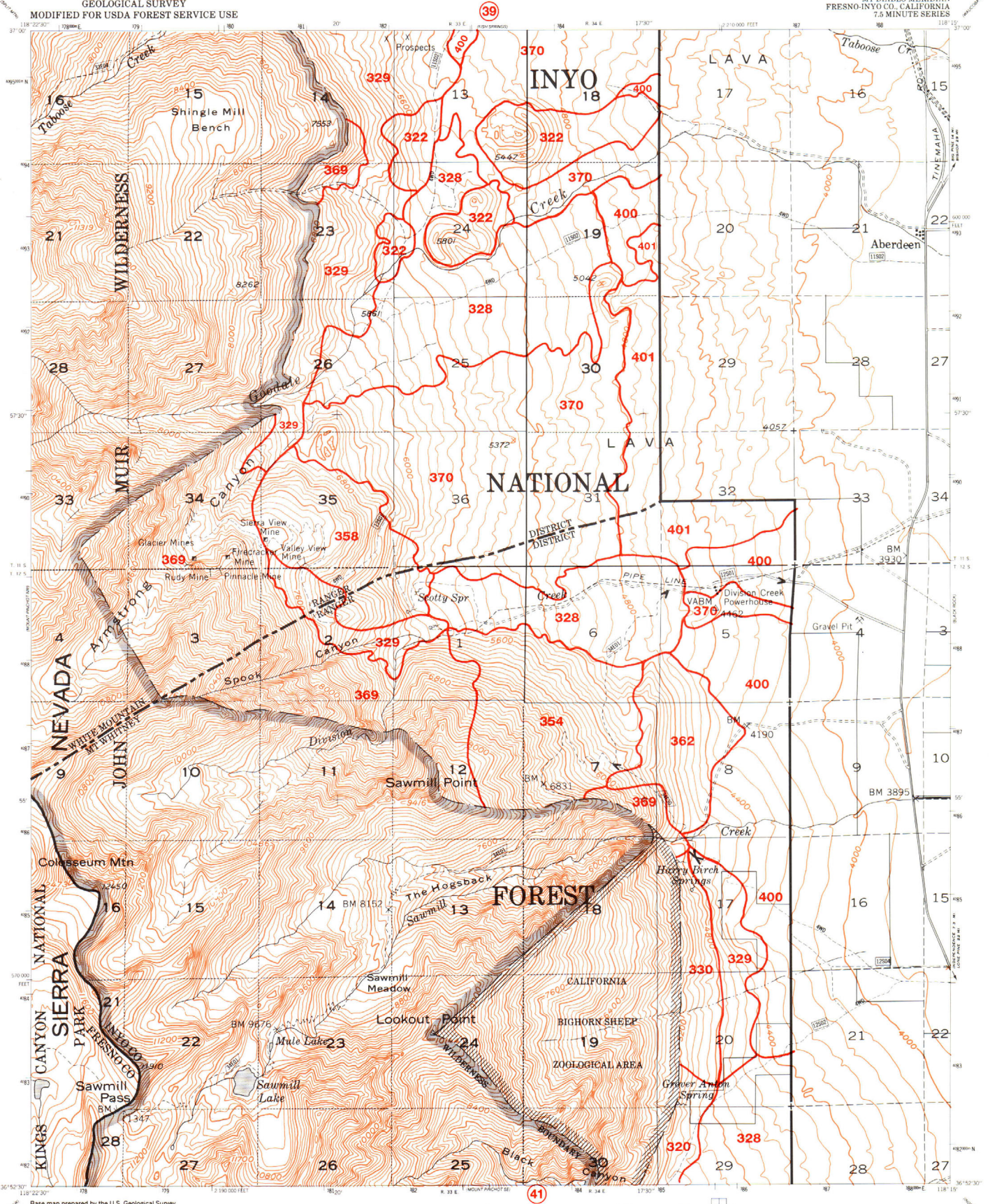
N3700-W11815/7.5
(393-4C)

FISH SPRINGS, CALIF.
PROVISIONAL EDITION 1984
N3700-W11815/7.5
(393-4C)

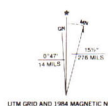
INYO NATIONAL FOREST AREA - WEST PART ORDER 3 SOIL SURVEY - SEPTEMBER 1983

MOUNT PINCHOT NE QUADRANGLE
MT DIABLO MERIDIAN
FRESNO-INYO CO. CALIFORNIA
7.5 MINUTE SERIES

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

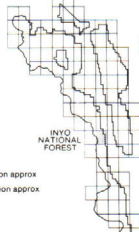


Base map prepared by the U.S. Geological Survey
Topography by photogrammetric methods from aerial photographs
Map edited 1953
Polyconic projection, 1927 North American datum
10,000-foot grid based on California coordinate system zone 4
10,000-metre Universal Transverse Mercator grid ticks zone 11
INTERIM EDITION
Photorevised by the Geomatics Service Center in 1984
from USGS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region



TOWNSHIP AND SECTION LINE CLASSIFICATION
— Surveyed, Location Reliable
--- Surveyed, Location Approximate
--- Unsurveyed, Probation
Landlet revised according to additional Forest Service evidence
City of Los Angeles Land
Withdrawn BLM Land

LEGEND
— Primary Highway
— Secondary Highway
— Improved Light Duty
— Unimproved Dirt
— Trail
— Locked Gate
— Barrier
— Railroad
— US Highway
— State Highway
— County Road
— Forest Highway
— Forest Road
— Forest Trail
— Forest Service Trail location approx
— Forest Service Road location approx



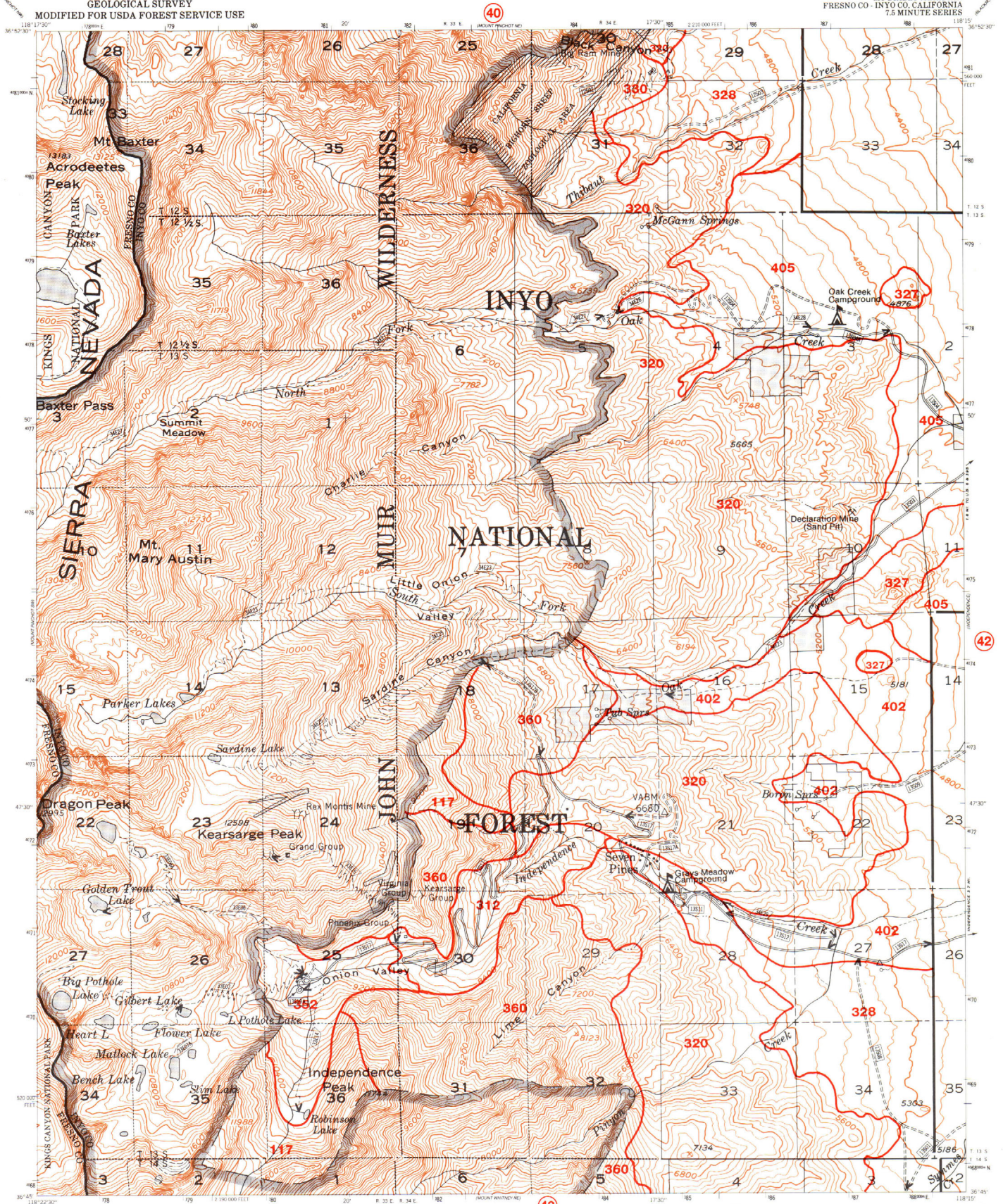
40

MOUNT PINCHOT NE, CALIF.
N3652.5-W11815.7.5
(373-1C)
REVISED 1984

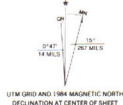
INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

MOUNT PINCHOT SE QUADRANGLE
MT DIABLO MERIDIAN
FRESNO CO - INYO CO, CALIFORNIA
7.5 MINUTE SERIES

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE



Base map prepared by the U.S. Geological Survey
Topography by photogrammetric methods from aerial photographs
Map dated 1953
Polyconic projection, 1927 North American datum
10,000-foot grid based on California coordinate system zone 4
1000-metre Universal Transverse Mercator grid ticks zone 11
INTERIM EDITION
Photorevised by the Geomatics Service Center in 1984
from USGS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region



CONTOUR INTERVAL 80 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

LEGEND

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Locked Gate
Barrier
Railroad
Withdrawn BLM Land

National Forest Boundary
Alienated Land within the Forest Boundary as of 1984

TOWNSHIP AND SECTION LINE CLASSIFICATION

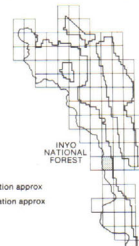
Surveyed, Location Reliable
Surveyed, Location Approximate
Unsurveyed, Projection

Landnet revised according to additional Forest Service evidence

City of Los Angeles Land

US Highway
State Highway
County Road
Forest Highway
Forest Road
Forest Trail

Forest Service Trail location approx
Forest Service Road location approx



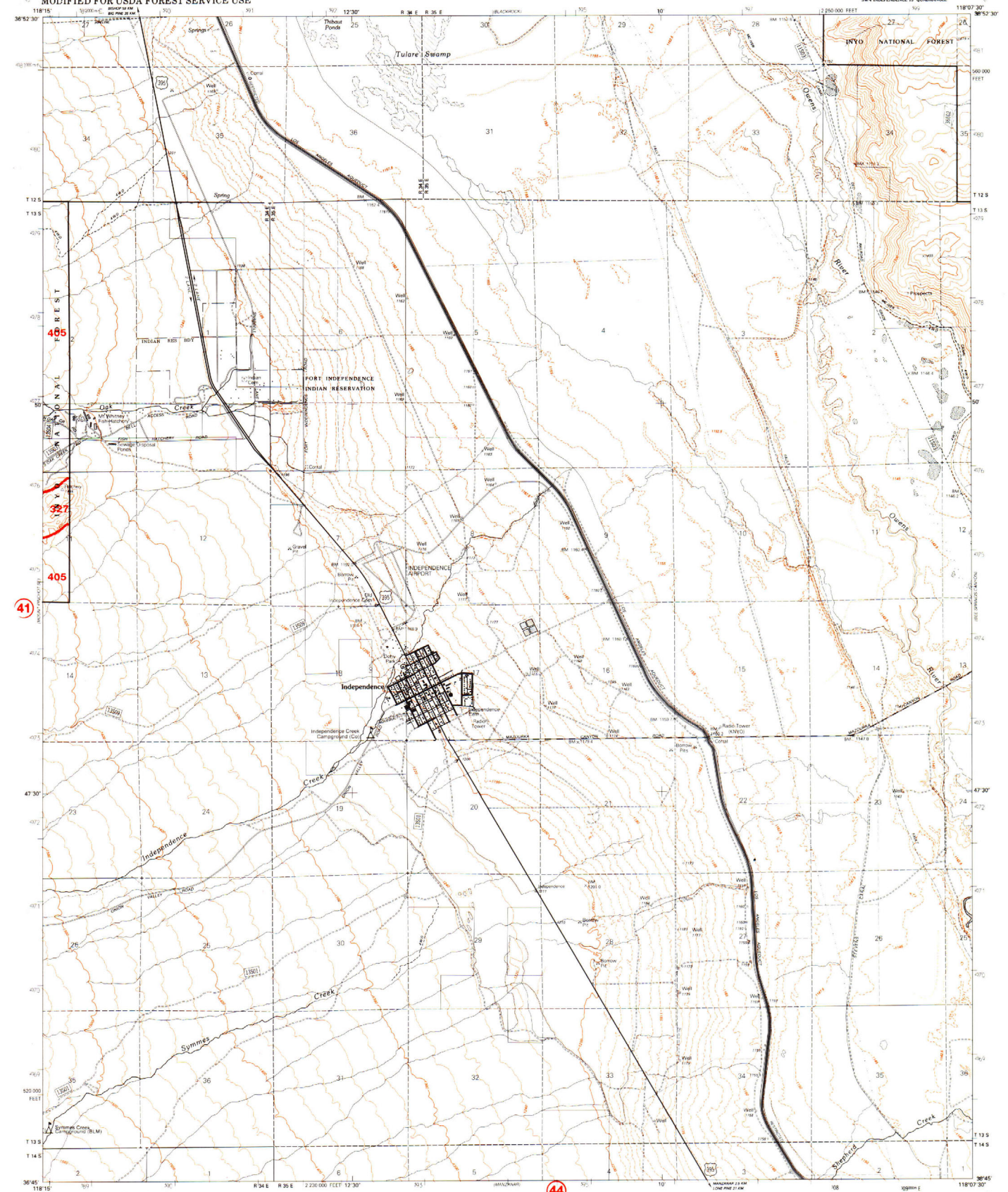
41

MOUNT PINCHOT SE, CALIF
N3645-W11815/7.5
(373-4C)
REVISED 1984

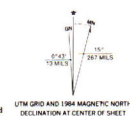
INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

INDEPENDENCE QUADRANGLE
CALIFORNIA-INYO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
N44 INDEPENDENCE 11 QUADRANGLE



Base map prepared by the U.S. Geological Survey
Control by USGS and NOS/NOAA
Compiled by photogrammetric methods from aerial photographs
taken 1978. Field checked 1979. Map edited 1982
Projection and 1000-meter grid, zone 11,
Universal Transverse Mercator
10,000-foot grid ticks based on California coordinate
system, zone 4, 1927 North American Datum
To place on the predicted North American Datum 1983
move the projection lines 9 meters north and
83 meters east as shown by dashed corner ticks
Fine red dashed lines indicate selected fence and field lines where
generally visible on aerial photographs. This information is unchecked
Photorevised by the Geomatics Service Center in 1984.
Photorevised by the Geomatics Service Center in 1984.
Photorevised by the Geomatics Service Center in 1984.
Photorevised by the Geomatics Service Center in 1984.



CONTOUR INTERVAL 20 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

- LEGEND**
- National Forest Boundary
 - Alienated Land within the Forest Boundary as of 1984
 - TOWNSHIP AND SECTION LINE CLASSIFICATION
 - Surveyed, Location Reliable
 - Surveyed, Location Approximate
 - Unsurveyed, Protraction
 - Landnet revised according to additional Forest Service evidence
 - City of Los Angeles Land
 - Primary Highway
 - Secondary Highway
 - Improved Light Duty
 - Unimproved Dirt
 - Trail
 - Locked Gate
 - Barrier
 - Railroad
 - Withdrawn BLM Land
 - US Highway
 - State Highway
 - County Road
 - Forest Highway
 - Forest Road
 - Forest Trail
 - Forest Service Trail location approx
 - Forest Service Road location approx



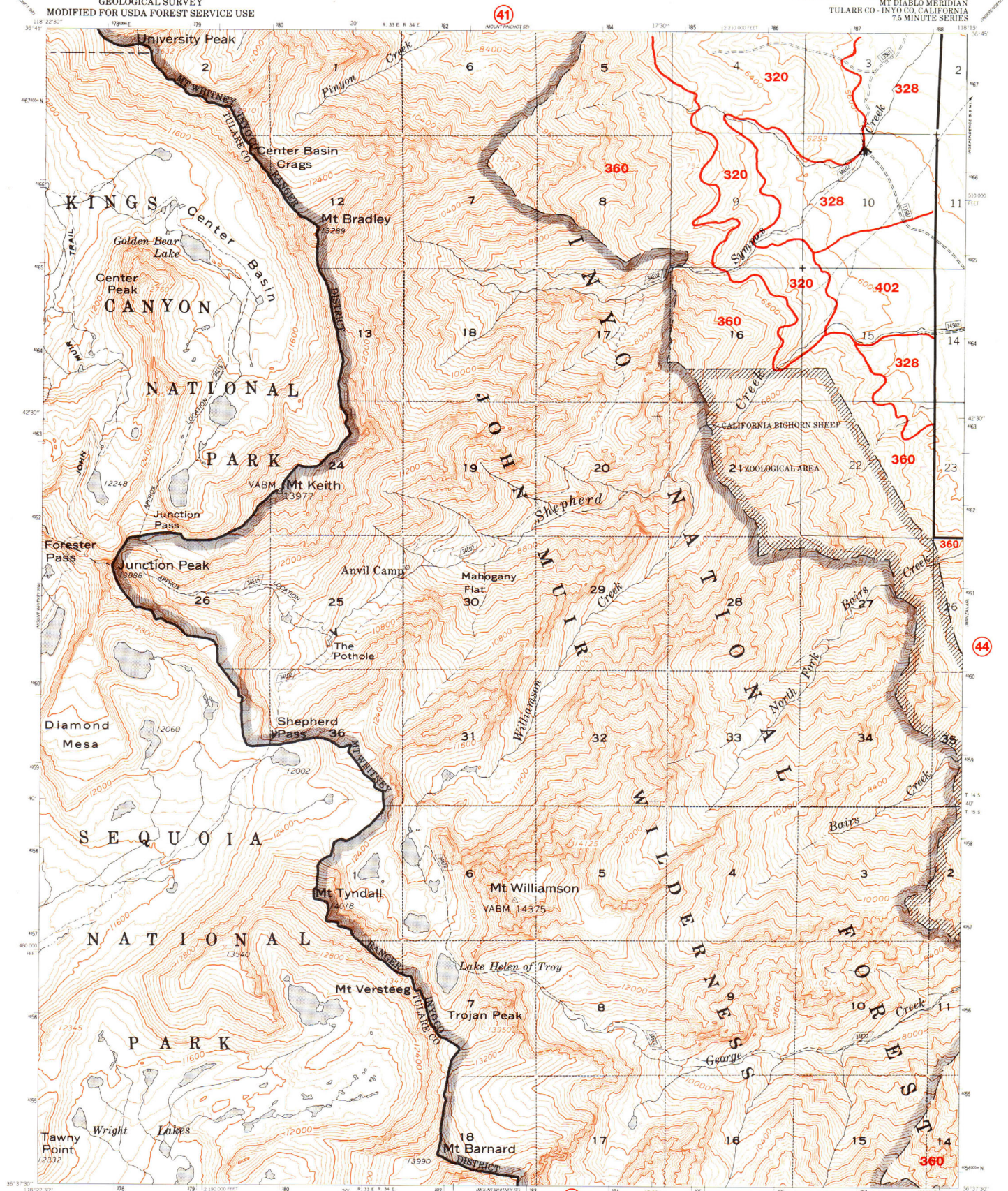
42

INDEPENDENCE, CALIF.
SW4 INDEPENDENCE 11 QUADRANGLE
N3645-W11807 5/5
1982
REVISED 1984
(372-3C)

INYO NATIONAL FOREST AREA - WEST PART ORDER 3 SOIL SURVEY - SEPTEMBER 1983

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

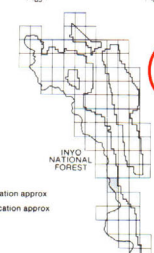
MOUNT WHITNEY NE QUADRANGLE
MT DIABLO MERIDIAN
TULARE CO - INYO CO, CALIFORNIA
7.5 MINUTE SERIES



Base map prepared by the U.S. Geological Survey
Topography by photogrammetric methods from aerial photographs
Map edited 1984
Polyconic projection, 1927 North American datum
10,000-foot grid based on California coordinate system zone 4
1000 metre Universal Transverse Mercator grid ticks zone 11
INTERIM EDITION
Photorevised by the Geomatrix Service Center in 1984
from USFS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region



TOWNSHIP AND SECTION LINE CLASSIFICATION		LEGEND	
—	Surveyed, Location Reliable	—	Primary Highway
---	Surveyed, Location Approximate	—	Secondary Highway
---	Unsurveyed, Projection	---	Improved Light Duty
---	Landnet revised according to additional Forest Service evidence	---	Unimproved Dirt
□	City of Los Angeles Land	---	Trail
□	Withdrawn BLM Land	---	Locked Gate
		---	Barrier
		---	Railroad
		---	Forest Trail location approx
		---	Forest Service Road location approx



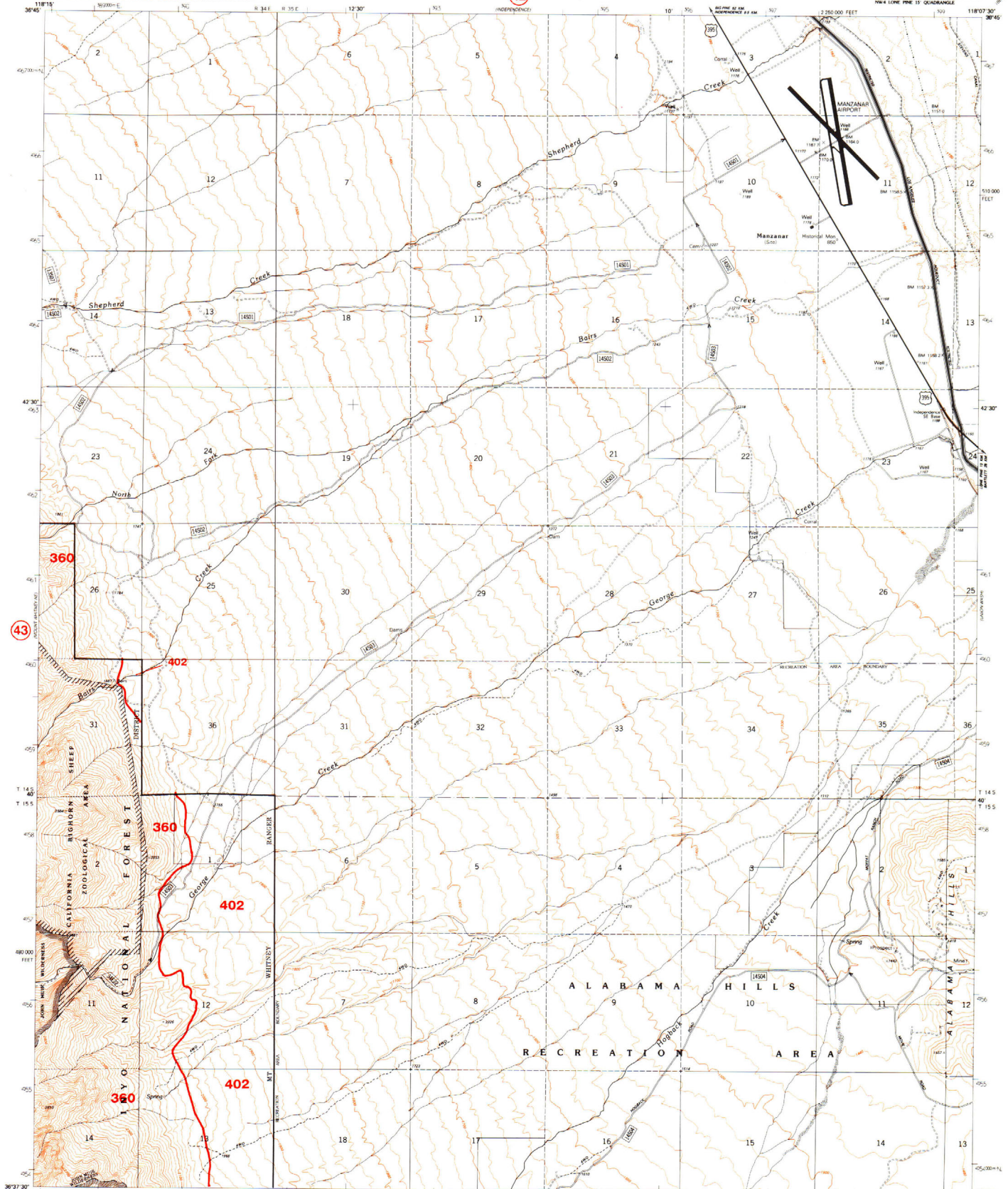
43

MOUNT WHITNEY NE, CALIF
NAD83 S.W. 1815.7.5
(352-1C)
REVISED 1984

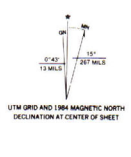
INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

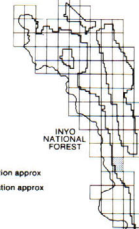
MANZANAR QUADRANGLE
CALIFORNIA-INYO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
NAD 83 LINE 10E 15 QUADRANGLE



Base map prepared by the U.S. Geological Survey
Center for the USGS and NOS-NOAA
Compiled by photogrammetric methods from aerial photographs
taken 1978. Field checked 1979. Map edited 1982
Projection and 1000-meter grid, zone 11
Universal Transverse Mercator
10,000-foot grid ticks based on California coordinate
system, zone 4, 1927 North American Datum
To place on the predicted North American Datum 1983
move the projection lines 9 meters north and
82 meters east as shown by dashed corner ticks
Five red dashed lines indicate selected fence and field lines where
generally visible on aerial photographs. This information is unchecked
Photorevised by the Geomatics Service Center in 1984
from USGS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region



- CONTOUR INTERVAL 20 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
- LEGEND**
- National Forest Boundary
 - Alienated Land within the Forest Boundary as of 1984
 - TOWNSHIP AND SECTION LINE CLASSIFICATION
 - Surveyed, Location Reliably
 - Surveyed, Location Approximate
 - Unsurveyed, Protection
 - Landnet revised according to additional Forest Service evidence
 - City of Los Angeles Land
 - Withdrawn BLM Land
 - Primary Highway
 - Secondary Highway
 - Improved Light Duty
 - Unimproved Dirt
 - Trail
 - Locked Gate
 - Barrier
 - Railroad
 - US Highway
 - State Highway
 - County Road
 - Forest Highway
 - Forest Road
 - Forest Trail
 - Forest Service Trail location approx
 - Forest Service Road location approx



TO CONVERT METERS TO FEET MULTIPLY BY 3.2808
TO CONVERT FEET TO METERS MULTIPLY BY 0.3048
CONTOUR ELEVATIONS SHOWN TO THE NEAREST 5 METERS
ELEVATIONS SHOWN TO THE NEAREST METERS

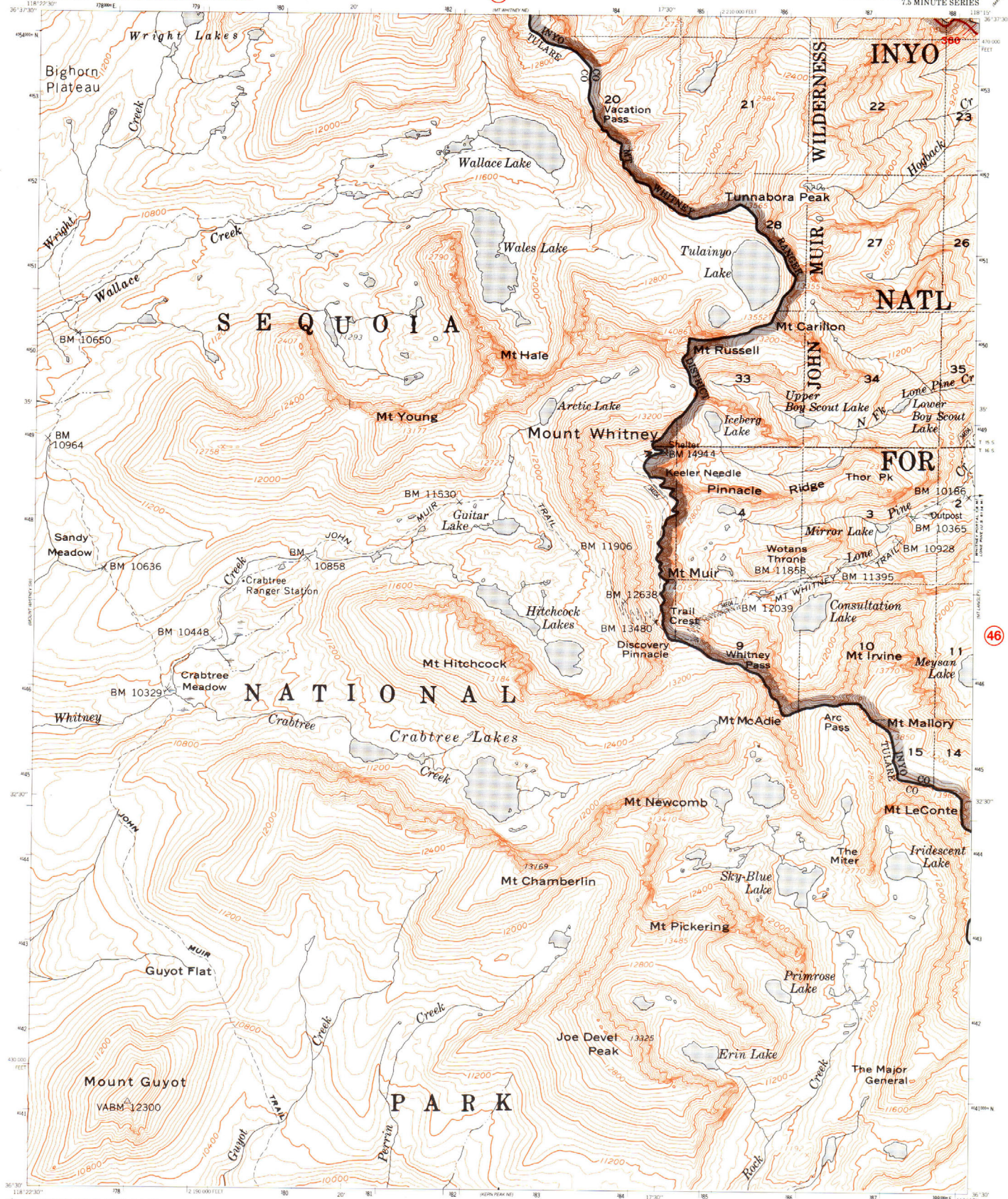
MANZANAR, CALIF.
NAD 83 LINE 10E 15 QUADRANGLE
NAD 83 5-101507 5/5

1982
REVISED 1984
(351-2C)

INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

MOUNT WHITNEY SE QUADRANGLE
MT DIABLO MERIDIAN
TULARE CO - INYO CO, CALIFORNIA
7.5 MINUTE SERIES

43



Base map prepared by the U.S. Geological Survey

Topography by photogrammetric methods from aerial photographs

Map edited 1996

Polycyclic projection, 1927 North American datum

10,000-foot grid based on California coordinate system zone 4

1000-metre Universal Transverse Mercator grid ticks zone 11

INTERIM EDITION

Photorevised by the Geomatics Service Center in 1984

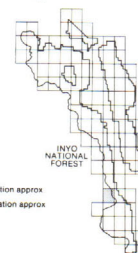
from USFS aerial photographs and 1984 correction guides

furnished by the Pacific Southwest Region



CONTOUR INTERVAL: 50 FEET
NATIONAL GEODETIC DATUM OF 1983

- LEGEND**
- National Forest Boundary
 - Alienated Land within the Forest Boundary as of 1984
 - Township and Section Line Classification
 - Surveyed, Location Approximate
 - Surveyed, Location Approximate
 - Unsurveyed, Protection
 - Landmark revised according to additional Forest Service evidence
 - Primary Highway
 - Secondary Highway
 - Improved Light Duty
 - Unimproved Dirt
 - Trail
 - Locked Gate
 - Barrier
 - Railroad
 - US Highway
 - State Highway
 - County Road
 - Forest Highway
 - Forest Road
 - Forest Trail
 - Forest Service Trail location approx
 - Forest Service Road location approx



45

MOUNT WHITNEY SE, CALIF.

N 3630 W 11815 T 5

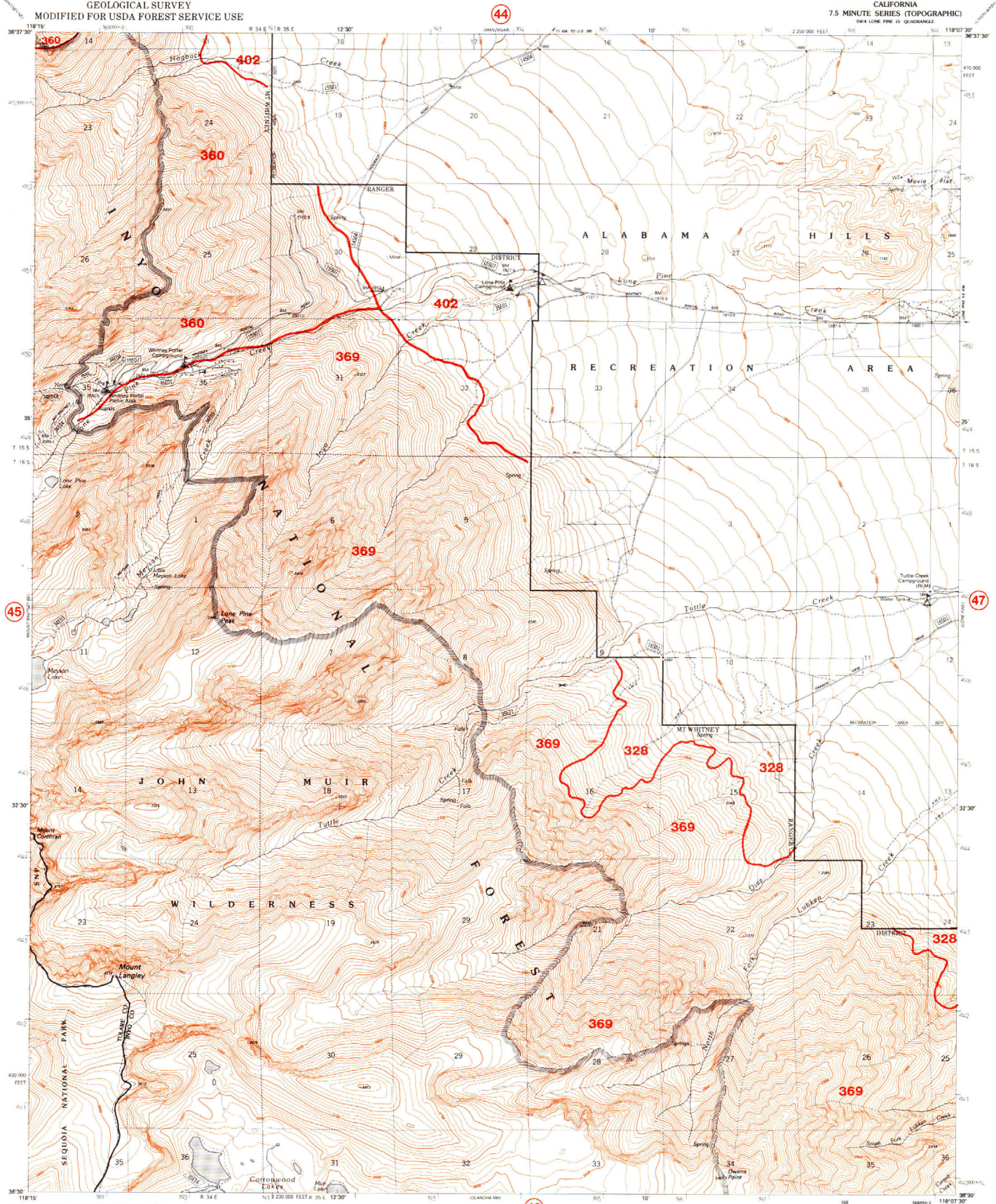
(352-4C)

REVISED 1984

INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

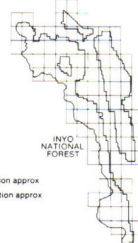
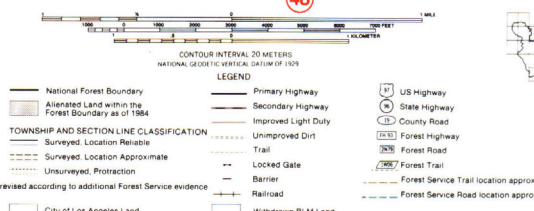
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

MT. LANGLEY QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SIX LINE ONE IS QUADRANGLE



Base map prepared by the U.S. Geological Survey
Control by USGS and NOS-NOAA
Compiled by photogrammetric methods from aerial photographs
taken 1978. Field checked 1979. Map edited 1982
Projection and 1000-meter grid, zone 11
Universal Transverse Mercator
10,000-foot grid ticks based on California coordinate
system, zone 4. 1927 North American Datum
To place on the predated North American Datum 1983
move the projection lines 8 meters north and
83 meters east as shown by dashed corner ticks
Photorevised by the Geomatics Service Center in 1984
from USGS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region

UTM GRID AND 1984 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



TO CONVERT METERS TO FEET MULTIPLY BY 3.2808
TO CONVERT FEET TO METERS MULTIPLY BY 0.3048
ELEVATIONS SHOWN TO THE NEAREST 5 METERS
OTHER ELEVATIONS SHOWN TO THE NEAREST METERS

46

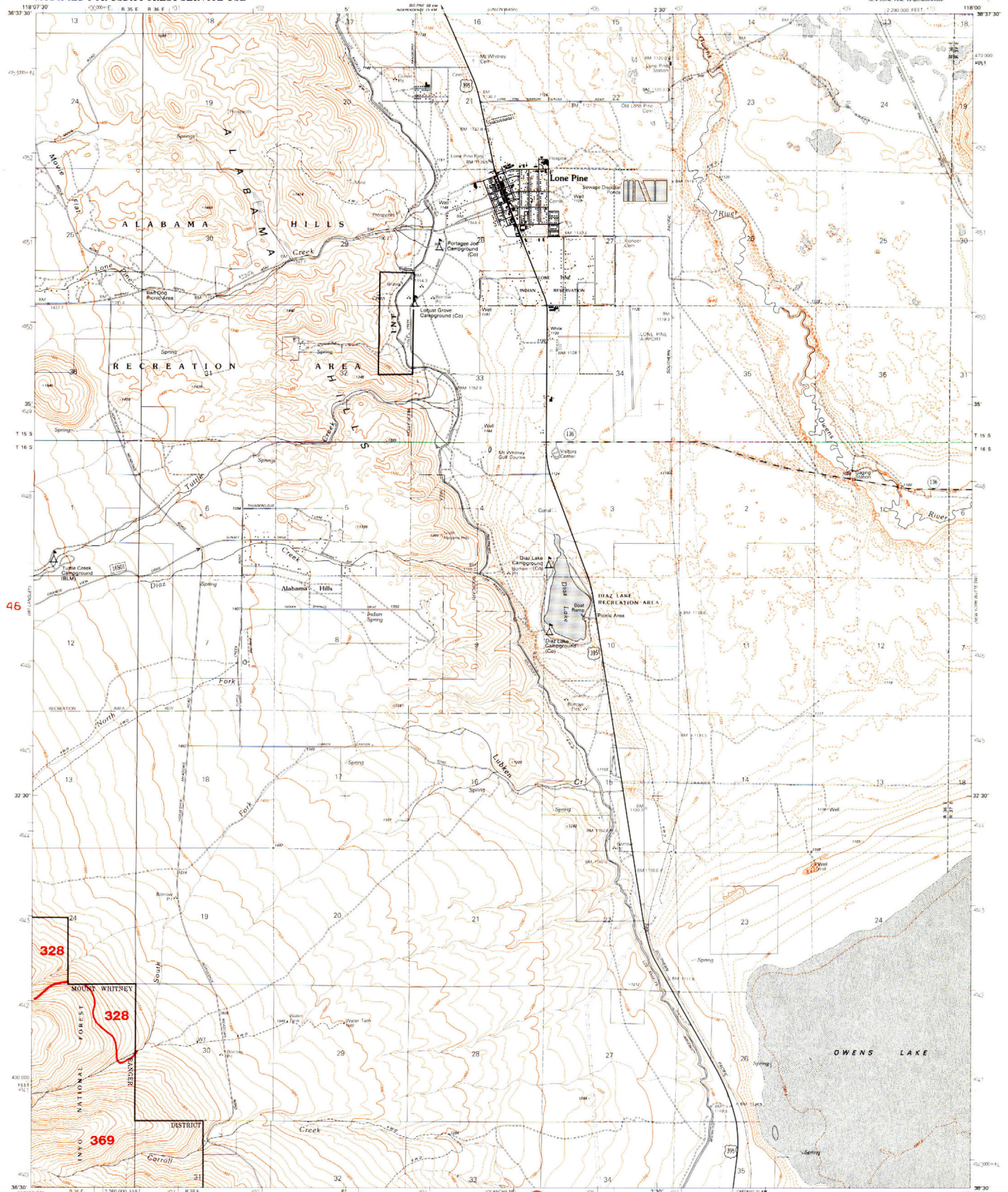
MT. LANGLEY, CALIF.
SIX LINE ONE IS QUADRANGLE
NAD83-WY11807.5/5

1982
REVISED 1984
(351-3C)

INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

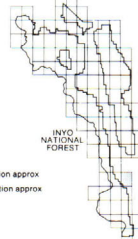
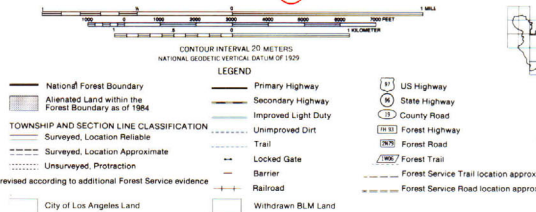
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LONE PINE QUADRANGLE
CALIFORNIA-INYO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
SCALE 1:62,500



Base map prepared by the U.S. Geological Survey
Control by USGS and NGS-NOAA
Compiled by photogrammetric methods from aerial photographs
taken 1978. Field checked 1979. Map edited 1982
Projection and 1000-meter grid, zone 11.
Universal Transverse Mercator
10,000-foot grid ticks based on California coordinate
system, zone 11, 1927 North American Datum
To place on the predicted North American Datum 1983
move the projection lines 8 meters north and
80 meters east as shown by dashed corner ticks
Photorevised by the Geomatics Service Center in 1984
from USFS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region

UTM GRID AND 1984 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



TO CONVERT METERS TO FEET MULTIPLY BY 3.2808
TO CONVERT FEET TO METERS MULTIPLY BY 0.3048
CONTROL ELEVATIONS SHOWN TO THE NEAREST 0.1 METERS
OTHER ELEVATIONS SHOWN TO THE NEAREST METERS

47

LONE PINE, CALIF.
SCALE 1:62,500
NAD83-W11800 7.5
1982
REVISED 1984
(351.4C)

INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

OLANCHA NW QUADRANGLE
MT DIABLO MERIDIAN
TULARE - INYO CO. CALIFORNIA
7.5 MINUTE SERIES



Base map prepared by the U.S. Geological Survey

Topography by photogrammetric methods from aerial photographs

Map edited 1956

Polyconic projection, 1927 North American datum

10,000-foot grid based on California coordinate system zone 4

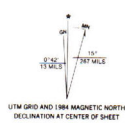
1000-metre Universal Transverse Mercator grid ticks zone 11

INTERIM EDITION

Photorevised by the Geomatrix Center in 1984

from USGS aerial photographs and 1984 correction guides

furnished by the Pacific Southwest Region

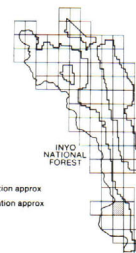


CONTOUR INTERVAL 80 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

TOWNSHIP AND SECTION LINE CLASSIFICATION	
—	Surveyed, Location Reliable
- - -	Surveyed, Location Approximate
...	Unsurveyed, Protraction
Landnet revised according to additional Forest Service evidence	
□	City of Los Angeles Land
□	Withdrawn BLM Land

LEGEND	
—	National Forest Boundary
—	Primary Highway
- - -	Secondary Highway
- - -	Improved Light Duty
- - -	Unimproved Dirt
- - -	Trail
- - -	Locked Gate
- - -	Barrier
- - -	Railroad
○	US Highway
○	State Highway
○	County Road
○	Forest Highway
○	Forest Road
○	Forest Service Trail location approx
○	Forest Service Road location approx



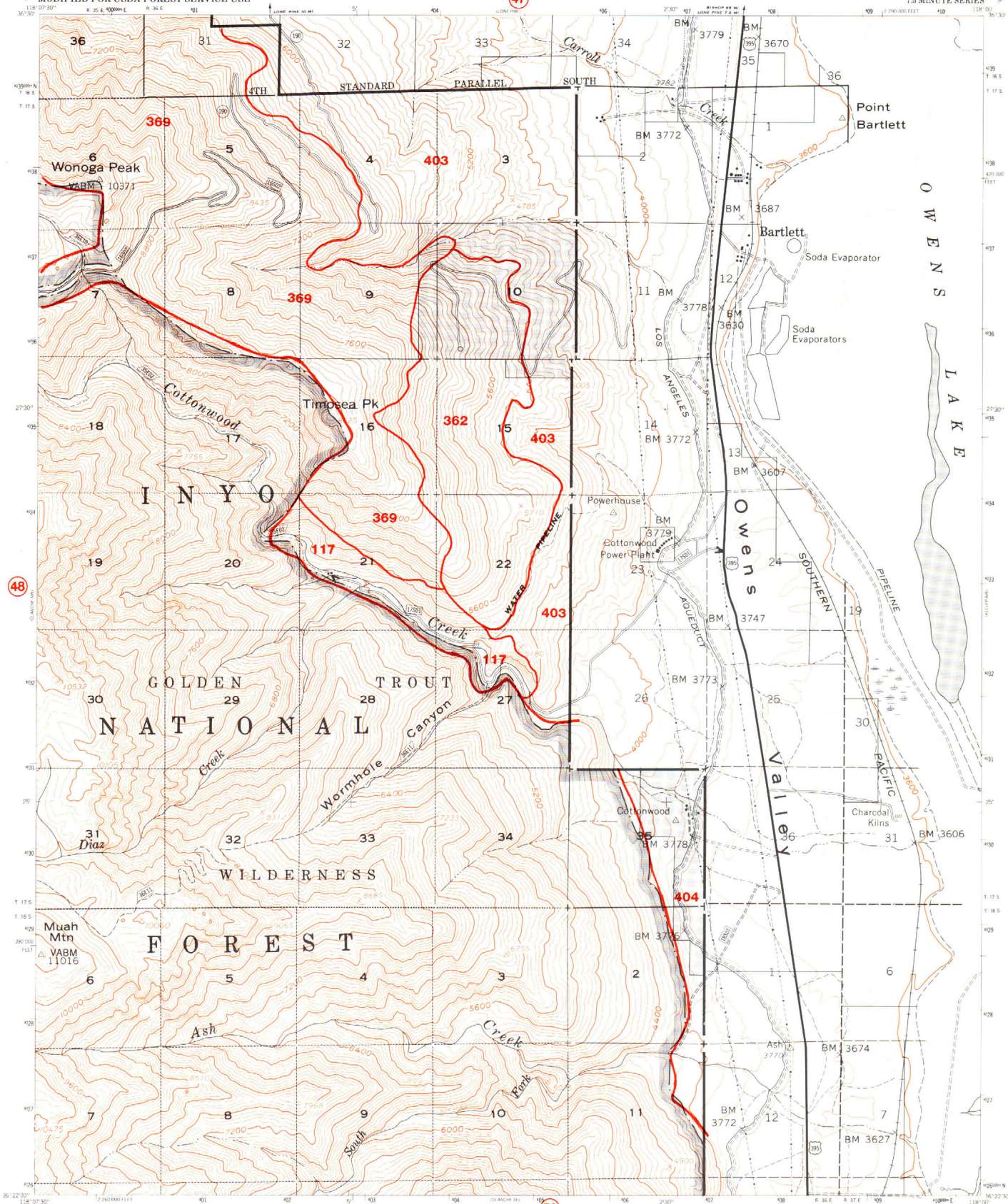
48

OLANCHA NW, CALIF
N3622.5 W11807.5 T.5
(329-2C)
REVISED 1984

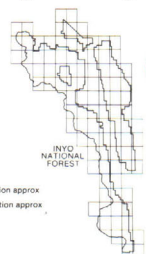
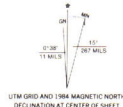
INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

OLANCHA NE QUADRANGLE
MT DIABLO MERIDIAN
INYO CO., CALIFORNIA
7.5 MINUTE SERIES

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE



Base map prepared by the U.S. Geological Survey
Topography by photogrammetric methods from aerial photographs
Map edition 1956
Polyconic projection 1927 North American datum
10,000-foot grid based on California coordinate system zone 4
1000-metre Universal Transverse Mercator grid ticks zone 11
INTERIM EDITION
Photorevised by the Geomatrix Service Center in 1984
from USGS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region



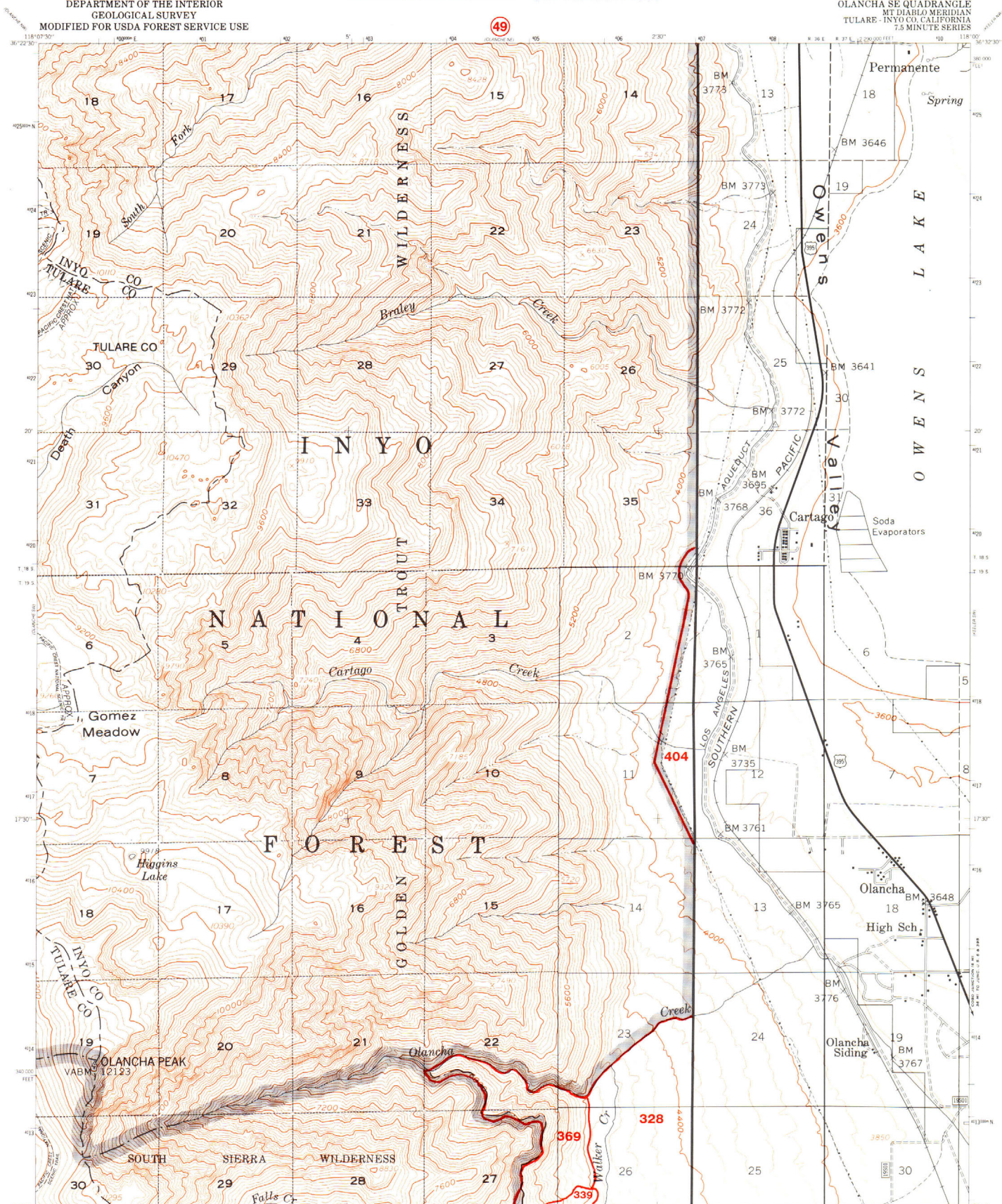
49

OLANCHA NE, CALIF
N3622.5-W11800.7.5
(329-1C)
REVISED 1984

INYO NATIONAL FOREST AREA - WEST PART ORDER 3 SOIL SURVEY - SEPTEMBER 1983

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

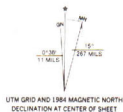
OLANCHA SE QUADRANGLE
MT DIABLO MERIDIAN
TULARE - INYO CO. CALIFORNIA
7.5 MINUTE SERIES



Base map prepared by the U.S. Geological Survey
Topography by photogrammetric methods from aerial photographs
Map edited 1956

Projection: 1927 North American datum
10,000 foot grid based on California coordinate system zone 4
1000 metre Universal Transverse Mercator grid ticks zone 11
INTERIM EDITION

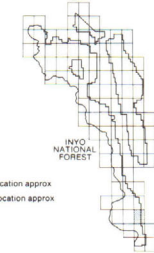
Photorevised by the Geomatics Service Center in 1984
from USFS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region



CONTOUR INTERVAL 80 FEET
NATIONAL GEOLOGIC TOPICAL DATUM OF 1929

TOWNSHIP AND SECTION LINE CLASSIFICATION	
—	Surveyed, Location Reliable
- - -	Surveyed, Location Approximate
...	Unsurveyed, Protection
—	Landnet revised according to additional Forest Service evidence
—	City of Los Angeles Land
—	Withdrawn BLM Land

LEGEND	
—	Primary Highway
—	Secondary Highway
—	Improved Light Duty
—	Unimproved Dirt
—	Trail
—	Locked Gate
—	Barrier
—	Railroad
—	Forest Service Trail location approx
—	Forest Service Road location approx



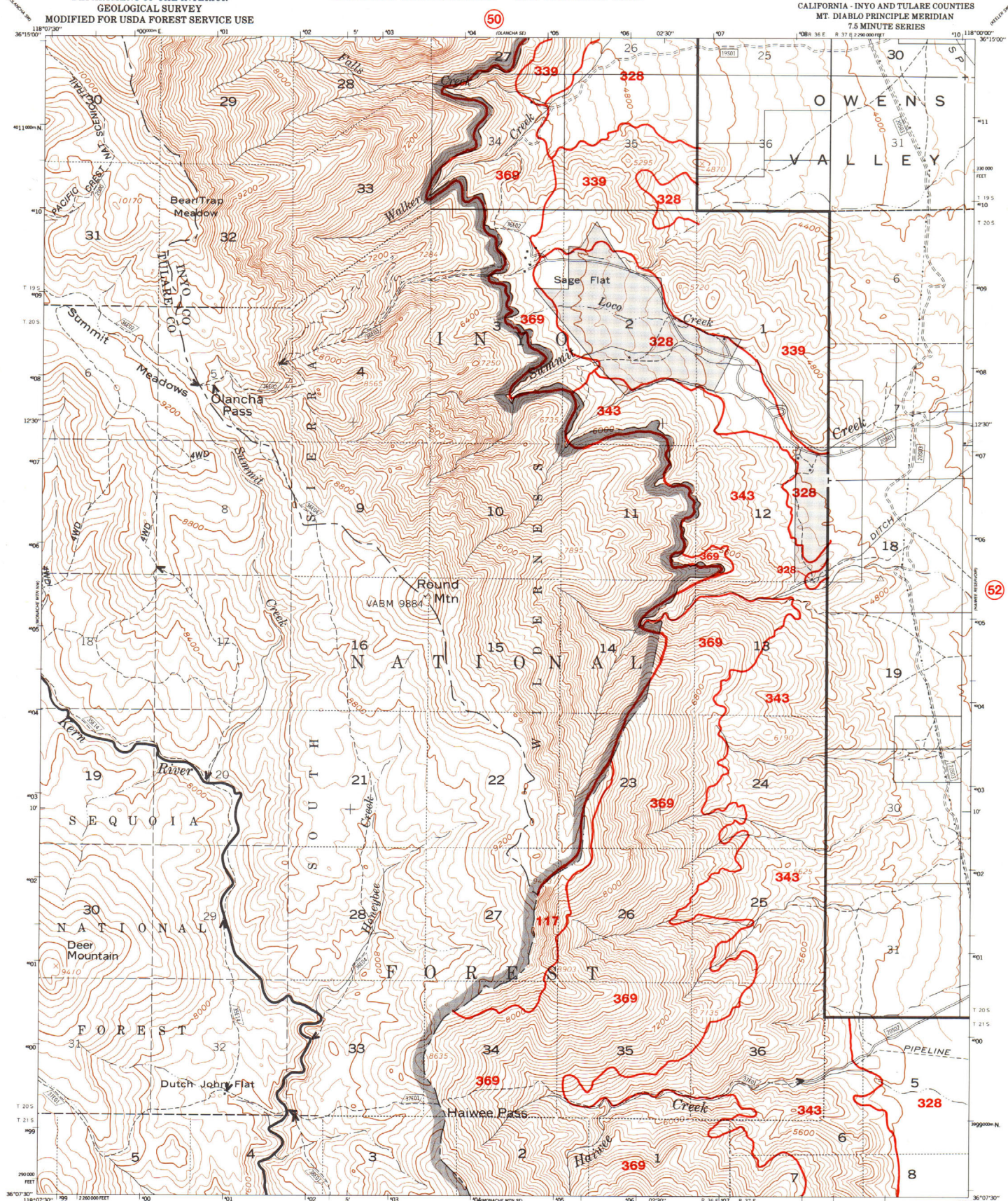
50

OLANCHA SE, CALIF
N3615 W18007.5
(329.4C)
REVISED 1984

INYO NATIONAL FOREST AREA - WEST PART ORDER 3 SOIL SURVEY - SEPTEMBER 1983

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

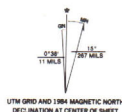
MONACHE MTN NE QUADRANGLE
CALIFORNIA - INYO AND TULARE COUNTIES
MT. DIABLO PRINCIPLE MERIDIAN
7.5 MINUTE SERIES



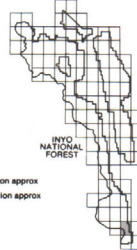
Base map prepared by the U.S. Geological Survey
Topography by photogrammetric methods from aerial photographs
Map edited 1976

Photorevised by the Geomatics Service Center in 1984
from 1976 aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region

INTERIM EDITION
Photorevised by the Geomatics Service Center in 1984
from 1976 aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region



- LEGEND**
- National Forest Boundary
 - Altered Land within the Forest Boundary as of 1984
 - TOWNSHIP AND SECTION LINE CLASSIFICATION
 - Surveyed, Location Reliable
 - Surveyed, Location Approximate
 - Unsurveyed, Protraction
 - Landmark revised according to additional Forest Service evidence
 - City of Los Angeles Land
 - Primary Highway
 - Secondary Highway
 - Improved Light Duty
 - Unimproved Dirt
 - Trail
 - Locked Gate
 - Barrier
 - Railroad
 - Withdrawn BLM Land
 - US Highway
 - State Highway
 - County Road
 - Forest Highway
 - Forest Road
 - Forest Trail
 - Forest Service Trail location approx
 - Forest Service Road location approx



51

MONACHE MTN NE, CALIF.

N3007.5-W11800/7.5

(306-1C)

REVISED 1984

HAIWEE RESERVOIRS QUADRANGLE
CALIFORNIA—INYO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This is a detailed topographic map of a region featuring two large reservoirs, North Hawes Reservoir and South Hawes Reservoir. The map is overlaid with a grid system, with numbers 1 through 36 visible in the corners of the grid cells. Contour lines are drawn in brown, indicating elevation changes. A road, likely Highway 196, runs vertically through the left side of the map. A red arrow in the bottom-left corner points to a specific location labeled with the number 328. The map also shows various smaller features like streams, trails, and possibly some buildings or structures. The overall color scheme is dominated by the brown tones of the contour lines and the white background of the map.

UTM GRID AND 1984 MAGNETIC NORTH

TO CONVERT METERS TO FEET MULTIPLY BY 3.2808
TO CONVERT FEET TO METERS MULTIPLY BY 0.3048
CONTROL ELEVATIONS SHOWN TO THE NEAREST 0.1 METERS
OTHER ELEVATIONS SHOWN TO THE NEAREST METERS

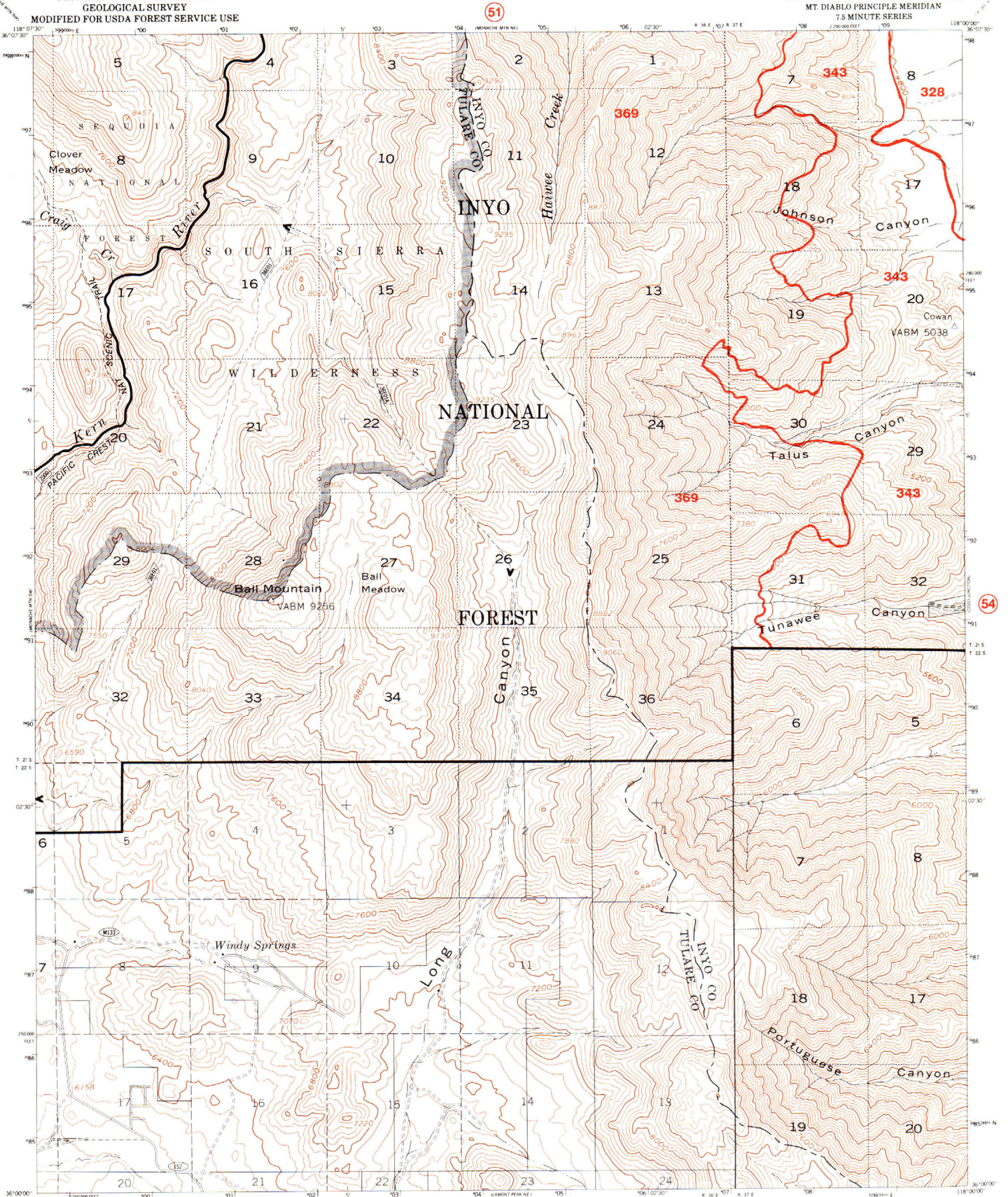
52

HAIWEE RESERVOIRS, CALIF.
PROVISIONAL EDITION 1982
N 3607.5-W 11752.5 & 7.5
(305-2C)
REVISED 1984

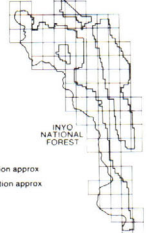
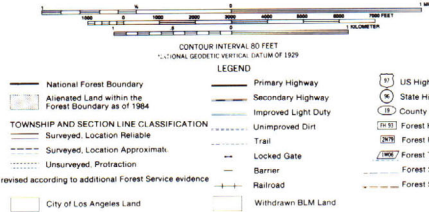
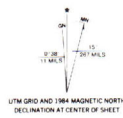
INYO NATIONAL FOREST AREA - WEST PART
ORDER 3 SOIL SURVEY - SEPTEMBER 1983

MONACHE MTN SE QUADRANGLE
CALIFORNIA - INYO AND TULARE COUNTIES
MT DIABLO PRINCIPLE MERIDIAN
7.5 MINUTE SERIES

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE



Base map prepared by the U.S. Geological Survey
Topography by photogrammetric methods from aerial photographs
Map revised 1976
Polyconic projection, 1927 North American datum
10,000 foot grid based on California coordinate system zone 4
1000 metre Universal Transverse Mercator grid ticks zone 11
INTERIM EDITION
Photorevised by the Geomorphics Service Center in 1984
from USFS aerial photographs and 1984 correction guides
furnished by the Pacific Southwest Region



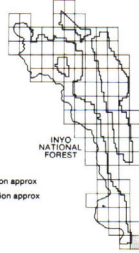
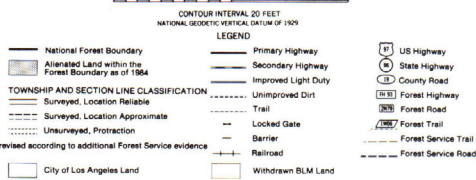
53
MONACHE MTN SE, CALIF
N3600 W11800 7.5
(306-4C)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

52



UTM GRID AND 1984 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



54

COSO JUNCTION, CALIF.
PROVISIONAL EDITION 1982
N3600-W11752.5/7.5
(305-3C)
REVISED 1984